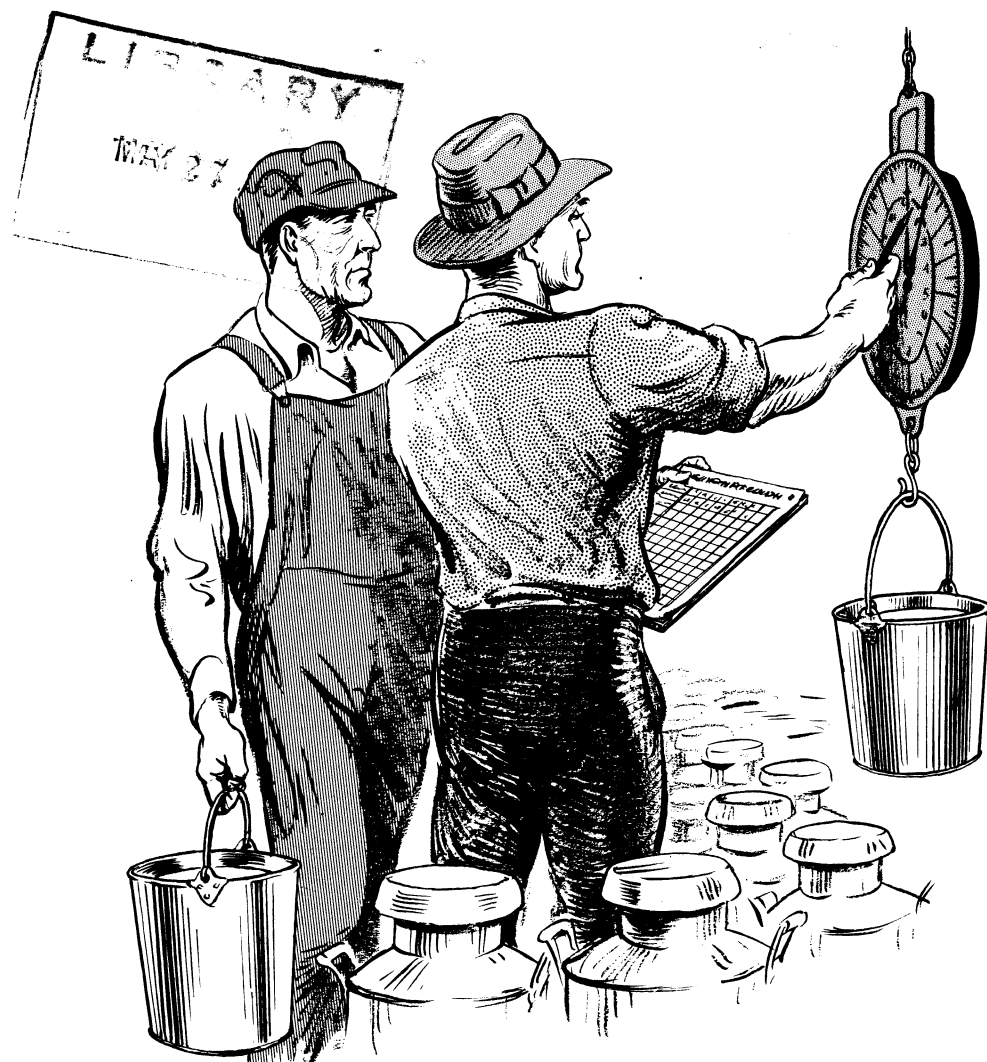


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THE DHIA SUPERVISOR'S MANUAL



AGRICULTURE HANDBOOK 96

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Agricultural Research Service

UNITED STATES DEPARTMENT OF AGRICULTURE

THE SUPERVISOR'S JOB

The supervisor of a dairy-herd-improvement association has a great responsibility and also has many opportunities to be of service. He is in position to be of material help to the members of his association, and if he does his job well he will bring much credit to himself.

To be successful, the supervisor must be enthusiastic about dairying and he should have a knowledge (gained by experience, study, or training) of up-to-date methods of breeding, feeding, and managing a dairy herd. He should be trained thoroughly for his work, because most of it requires special knowledge and skill.

The supervisor must determine the production, feed consumption, and income for each cow in the herd, and keep complete records so the herd owner can use the records as a guide in feeding and culling the herd for more efficient milk production. He must also keep complete, up-to-date identification records on all animals in the herd, so the owner can use the production records in a progressive breeding program.

The supervisor's records and reports are used not only by the individual herd owner and by the association, but also by the Dairy Husbandry Research Branch and the State extension services. These agencies use the records as the basis of a nationwide program for proving all sires used in dairy-herd-improvement associations and for locating the animals or families that transmit high production. It is most important that the supervisor fill out completely and properly the various blank forms used in the association work. He should understand thoroughly the exact nature of the information wanted about each item in these forms and how to record it properly.

Because of the accuracy required in collecting and reporting the identification and production records, well-trained supervisors are of vital importance to the successful operation of the whole dairy-herd-improvement-association program. The purpose of this manual is to provide the supervisor with complete instructions for obtaining the production and feed records required, for making the necessary tabulations, and for preparing the various reports.

The supervisor should study the manual carefully and refer to it frequently to insure that his work in the association always conforms to the high standards of the dairy-herd-improvement-association program.

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Chapter I. The DHIA Program

The primary purpose of a dairy-herd-improvement association is to afford the members an economical method of obtaining information they can use in improving the producing efficiency of their herds. The records of identification, production, feed cost, and income enable the herd owner to cull the least profitable cows, to feed the rest according to their production requirements, and to select the most suitable animals for breeding up the inherent producing ability of the herd.

Dairy-herd-improvement associations are organized by farmers and are operated as agricultural extension demonstration projects under the supervision of State extension dairymen and county agricultural agents, in cooperation with the Dairy Husbandry Research Branch. As demonstration projects, they encourage farmers to adopt improved methods of dairy husbandry.

A Dairy-Herd-Improvement Association

A typical dairy-herd-improvement association is an organization of about 26 dairy farmers who employ cooperatively a man, called the supervisor, to determine the quantity of milk and butterfat produced by each cow in each herd, the cost of the feed used in its production; and also to keep a record of the information obtained.

County Associations

In recent years more and more associations have been organized on a county basis. The county association employs as many supervisors as are needed to conduct the testing work in all the herds enrolled. Some county associations operate a central testing laboratory where all milk samples are tested and all records are calculated. Regardless of the type of organization and method of operation, the testing work in herds under standard test (tested according to the American Dairy Science Association uniform rules governing the operation of dairy-herd-improvement associations, which are listed in ch. XV) is conducted as outlined herein.

Most county associations that operate a central testing laboratory in addition to conducting standard testing also conduct owner-sampler testing. As the name implies, in owner-sampler testing the herd owner takes milk samples and weights on each cow in his herd. The samples are tested in the central laboratory where the records are calculated. The records are private records suitable for the herd owner to use in feeding and culling his herd, and in selecting the cows in his herd from which to save heifer calves for herd replacements. The records are not used in the nationwide proved-sire program because the milk samples and weights were not obtained by a disinterested person, the association supervisor.

Statewide Organizations

In several States, the local and county associations have formed statewide organizations or federations.

Representatives from each local and county association make up the board of directors of the State organization, which usually is financed by assessing member associations on a per-cow basis. A State organization, in cooperation with the State college, can render valuable service to the dairy-herd-improvement program in the State in the following ways: (1) Establish State DHIA policies and rules; (2) coordinate the programs of the local associations; (3) interpret and enforce all DHIA rules uniformly throughout the State; (4) establish standards of performance for supervisors; (5) determine the status of the State associations for income-tax purposes; and (6) arrange on a statewide basis for compensation and liability insurance for the supervisors, social-security payments, etc.

Broad Program of Herd Improvement

Although each association benefits its individual members, the information obtained from these associations is used also in a national extension program for improving the general efficiency of dairying throughout the country. In general, the objective of this larger program is to so improve the association herds that they may serve as sources of breeding stock for improving the whole dairy-cattle population.

Because the use of good proved sires and sons of such sires is the surest and quickest way to improve the inherent producing ability of dairy herds, the Dairy Husbandry Research Branch and the State extension services are cooperating in a nationwide program to prove all sires that are used in association herds and to aid in disseminating and perpetuating the hereditary influence of the outstanding sires.

Forms Used for Recording Data

The Dairy Husbandry Research Branch, through the office of the State extension dairyman, makes available to dairymen who are members of standard dairy-herd-improvement associations, forms for recording identification, feed, and production data obtained in accordance with the DHIA rules of the American Dairy Science Association. The list of forms is as follows:

- DHIA-2 (or DHIA-2A), Barn-book filler and binder.
- DHIA Herd-Record Book filler. The individual forms that make up the herd-record book are listed in chapter X. The forms are furnished to cooperating dairymen by the Dairy Husbandry Research Branch, through the office of the State extension dairyman, with the understanding that the data collected during the year will be reported to the Branch for study and analysis. Herd-record book binders are obtained by purchase through the office of the State extension dairyman.
- DHIA-4, Monthly Association Summary.
- DHIA-718, DHIA Production Report Card.
- DHIA-780, Yearly Herd Summary.

In addition to the above record and report forms, the State extension dairyman may supply additional forms to meet the special needs of the DHIA program within the State. You will receive special instructions from your State extension dairyman regarding the use of the additional State forms.

Chapter II. Outline of Supervisor's Work

If you are a DHIA supervisor in a typical dairy-herd-improvement association, you will visit each herd once a month. (If you are a supervisor in an association that operates on the so-called bimonthly testing plan, you will visit each herd only once in 2 months.) As a rule, you will arrive at the farm early in the afternoon, or at least 1 hour before milking time, and remain until about the same time the following day. If the association operates on a county plan with a central testing laboratory, you may leave the farm after you obtain the milk weights and samples at the evening milking and return the following morning to obtain personally the milk weights and samples at the morning milking. Regardless of the plan of operation of the association, your work as a DHIA supervisor is essentially as outlined in this manual.

In order to obtain reliable and comparable records, standard DHIA testing work is performed in accordance with rules established by the American Dairy Science Association. (See ch. XV.) The principal points of the rules are: (1) In each herd all weighing, sampling, and testing of milk must be done by the supervisor; (2) all cows of milking age in the herd, including dry cows, must be on test, regardless of ownership; (3) all cows, including dry cows, that have been on test in the herd during the year must be included in the yearly herd average; and (4) the supervisor must use the figures he himself obtains on the testing day as a basis for computing the monthly and yearly production records. All reports must be compiled and made by the supervisor.

You are never permitted to modify these rules. However, in some cases the board of directors of a local DHIA, with the advice and approval of the State extension dairyman, may modify the rules slightly to meet local conditions. It is your responsibility as a supervisor to see that the rules (either the standard rules, or the slightly modified rules approved for your association) are followed. If any basic rule is not followed, the herd is not on standard DHIA test. General confidence in DHIA records is maintained and enhanced when all standard DHIA testing work is done in conformity with DHIA rules. Any supervisor who makes exceptions or permits any association member to make exceptions to the rules loses the confidence of that member and all other members of the association. You should refer any questions about the interpretation of the rules to your State extension dairyman.

Your duties as a DHIA supervisor during the 24-hour period on each farm are, in general, as follows:

Evening Work

1. Arrive at the farm at least 1 hour before milking time so as not to cause any delay in the evening milking.

2. Before milking time, fill in the heading of the barn-book sheet, DHIA-2 (or DHIA-2A); also list all cows in the herd by name and number on the barn-book sheet.

3. Definitely identify each cow in the herd from markings or eartag number with data in the herd-record book as the day's feed and milk records are obtained.

4. Obtain and record the dates when dry cows were turned dry.

5. Obtain and record the approximate dates when other cows will be turned dry during the next testing period.

6. Obtain and record the freshening dates of cows that have freshened since the last test and the date new cows were purchased.

7. Make note of cows that may freshen before the next test.

8. Weigh or measure the grain fed to each cow and determine on a herd basis the amount of roughage consumed. Record weights on the barn-book sheet, DHIA-2 (or DHIA-2A). Usually with the help of the owner you can estimate in the evening the quantity of feed to be fed in the morning. If so, you can calculate the month's feed and cost records for the herd in the evening.

9. Weigh the milk of each cow in the herd. Record weights on the barn-book sheet, DHIA-2 (or DHIA-2A).

10. Mix the milk from each cow thoroughly by pouring it 2 or 3 times from one pail to another; then take the sample.

11. Number the sample jars of milk to correspond with the numbers of the cows on the barn-book sheet. Keep the sample jars closed tightly and in a locked box until time to determine the percentage of butterfat in the milk.

12. Record the prices of all feeds fed (market value or cost on farm).

13. Calculate and record the amount and cost of feed fed the herd during the testing period (if you have estimated the quantity of morning feed).

14. Record the prices received for milk and butterfat.

15. Get as much of the information indicated above as possible in the evening. The dairyman is likely to be too busy in the morning to have time to give you the data you need to complete the records.

16. Discuss herd problems with the owner and become so familiar with each part of the herd-record book that you can show the owner how to use the book as an aid in improving the feeding, management, and breeding of his dairy herd.

Morning Work

1. Be on the job before milking time. Weigh or measure the grain fed each cow (if you did not do so the previous evening).

2. Weigh and sample the milk from each cow as you did in the evening.

3. Test a composite sample of the evening's and morning's milk of each cow for butterfat content. Greater accuracy is obtained by using proportionate

quantities from each milking in making up the composite sample.

4. Complete all calculations on the barn-book sheet, DHIA-2 (or DHIA-2A).

5. Post total and average data for the herd from form DHIA-2 (or DHIA-2A) to form DHIA-12 in the herd-record book.

6. Copy individual cow records from the barn-book sheet, DHIA-2 (or DHIA-2A), into the herd-record book on form DHIA-22 (or DHIA-22A).

7. If you are qualified, make feed recommendations. Write them on the back of the barn-book sheet, DHIA-2 (or DHIA-2A), or on the barn feeding sheet, if your State provides one.

8. Be sure that all information is complete in the owner's herd-record book.

9. Eartag all unidentified calves and purchased animals that have entered the herd since your last visit (see ch. XI).

10. Use the special measuring tape in your supervisor's testing outfit to estimate the weight of each cow that freshened or was purchased since your last visit and record her weight in "Remarks" column of DHIA-2

(or DHIA-2A) and on the DHIA-22 (or DHIA-22A) record of the cow in the herd-record book.

11. No identification record exists until the identification data are recorded. Record the identification data on form DHIA-16 and on the dam's DHIA-22 (or DHIA-22A) record in the owner's herd-record book.

12. Report on form DHIA-718 the production record of each cow that has gone dry or has completed the first 305 days of her lactation period (discussed in ch. XII). Write in the herd-record book the date you report the record.

13. Go over the record with the farmer. If qualified, discuss feeding problems or any other phase of herd improvement the records indicate should be brought to his attention.

14. Before you leave the farm, recheck all phases of the work, to be sure that all records are up to date. Remember if your record work is not up to date, the dairyman may justifiably think you are not capable of handling your job.

15. Leave the herd-record book on the farm. It is the property of the herd owner. He will need it.

16. Fill out the monthly association summary, DHIA-4.

Chapter III. Testing Equipment

Standard Testing Equipment

(1) 24-bottle Babcock tester (combination hand and electrically operated, 500-watt heating element.)

(2) Field case with padlock (inside dimensions approximately 18 inches long, 7 inches wide, 10 inches deep) for the following equipment:

(a) 48 milk sample bottles (3-ounce bottles).

(b) 2 trays with bales (approximately 16½ inches long, 6¼ inches wide, 3¼ inches deep, with drain holes at 2¾-inch level). Each to hold 24 sample bottles arranged in 3 rows, 8 in each row.

(c) Two 30-cc. sample dippers (heavy type with rounded bottom).

(d) 60-pound scale, graduated in tenths.

(3) Field case with padlock (approximately 22½ inches long, 7 inches wide, 12 inches deep) for the following equipment:

(a) 48 milk test bottles (8-percent bottles, with 0.1 percent graduation). 24 bottles to be carried in rack in water bath tank; 24 bottles to be carried in 2 original cartons of 12 each.

(b) 2 pipets, 17.6 cc.

(c) 2 dairy thermometers (floating, 30°–220° F.).

(d) 2 skim-milk test bottles (for States requiring them).

(e) Needlepoint dividers with tension screw or Wagner butterfat reader.

(f) 3 brushes (1 test-bottle brush; 1 sample-bottle brush; 1 pipet brush).

(g) 2 acid dippers or measures.

(h) Acid bowl approximately 5 inches in diameter and 4 inches deep, if dippers are used.

(i) Electric heater for water bath (small hot-plate type).

(j) Water-bath tank 8½ inches deep, the width and length necessary to accommodate a rack holding 24 test bottles in 3 rows, 8 in a row. Tank to be made of copper or rustproof material, and marked with indentations on side showing level of water necessary to bring water to the proper height (approximately the 8-percent mark) when 12 test bottles, 18 test bottles, or 24 test bottles are placed in water bath.

(k) Rack to go in water bath and to hold 24 test bottles (3 rows, 8 in a row). Rack to have partitions between bottles and holes in bottom of rack. These holes should not be directly underneath the bottles.

(l) Shield to hold test bottles in position in rack and with some device to hold rack and bottles in position when they are submerged for washing.

(m) Small oil can and oil.

(n) Rubber cork for acid jug.

(o) Cow marking crayons.

(p) Dixon 352 white pencil.

(q) Tape for estimating weights of cows.

(r) DHIA eartagging outfit.

(4) Case for record forms, etc. (inside measurements 18 inches long, 6 inches wide, 12 inches deep).

(5) 2 seamless 20-quart milk pails.

(6) Extension cord with a three-way, plug-in socket.

Care of Testing Equipment

The condition and appearance of your testing equipment often are considered an indication of the type of person you are and the quality of work you do. Keep all your equipment clean and in good operating condition at all times.

Centrifuge

Keep it clean. Oil it frequently with a high-grade lubricant. Keep it adjusted properly and in repair. For repairs, write direct to the manufacturer or to your State extension dairyman.

Operate the centrifuge only on a level, firm foundation. Start and stop the machine slowly. In cold weather, warm the machine before using it. If possible, place it overnight in a warm room with the lid open. A cold centrifuge cools the test bottles below the temperature required to obtain an accurate test.

Scales

Keep the scales clean and free from rust. Do not drop or overload them. Wrap the scales in a dry cloth and keep them in a kit or dry box when not in use. Check the accuracy of the scales frequently, especially if they are old. With inaccurate scales, you are wasting your time and the dairyman's money, as you can obtain only worthless, misleading records.

Glassware

Glassware is expensive. Use, store, and carry it with care. If your supervisor's kit does not provide a specific place for the glassware, wrap it separately and carry it so jarring or shifting of equipment will not cause breakage.

Acid

Acid will burn holes in clothes and will burn the skin. In fact, it will burn or damage practically everything (except rubber or glass) with which it comes in contact.

You must regard the acid as dangerous and handle it accordingly.

If you accidentally spill acid on your skin, wash it off immediately. It is good practice to keep your hands wet while pouring the acid. Keep baking soda in your kit, handy for use in neutralizing spilled acid. To bring acid to the proper temperature, place it in a warm room in the evening, if possible. If the acid must be warmed in the morning, place the jug in a warm-water bath. If the acid and jug are cold, warm the jug in a lukewarm-water bath. Never place the jug in hot water or on a stove to warm it, for the heat may crack the jug and permit the acid and water to

mix, which would cause an explosion with probable disastrous results.

Always keep acid away from children. After you have completed the test, empty the test bottle, and any milk to which preservative was added, on an ash pile or some place where children or animals cannot get to it. Do not empty test bottles down a drain; the acid will damage the plumbing and may interfere with the bacterial action where septic tanks are used.

Carrying Case for Acid Jug

Carry the acid in a strong, glass jug with a hard-rubber stopper. Carry the jug in a strong, locked, wood case. The case should be made of not less than three-fourths-inch material and it should be padded on the sides and bottom to fit the jug snugly. It should be just deep enough so that when the lid is closed and locked, it automatically holds the jug stopper firmly in place. Keep the jug in the case at all times except when warming the acid in a water bath. When carrying the acid in a car, place it so that it will not tip over and so that in case of a traffic accident it cannot spill on the occupants of the car.

Cleaning Equipment

Test Bottles

1. While they are still hot, empty the test bottles in a safe place where acid will do no damage. Shake the bottles while emptying them, to keep sediment from sticking to the glass.

2. Rinse the bottles with cold or lukewarm water.
3. Replace the bottles in the water bath. Add a good dairy cleaner (not soap); put a little cleaner in the neck of each bottle.
4. Add hot water to the water bath, until water fills the test bottles.
5. Wash bottles thoroughly; use stiff brush on the necks of the bottles. If dirt has accumulated inside the bottles, add BB shot with the cleaner and rotate the bottles vigorously.
6. Empty bottles, rinse with warm water, and invert to drain.
7. Rinse with hot water, and invert to drain and dry.

Other Equipment

1. As soon as possible after use, rinse the sample bottles, pails, dippers, and other equipment with cold or lukewarm water.
2. After rinsing, scrub thoroughly with a stiff brush, using hot water and a good dairy cleaner.
3. Follow the washing operation with a hot-water rinse—the hotter the water, the better.
4. A final rinse in a chlorine solution (200 parts per million) will help to keep the milk samples from souring by destroying bacteria on the equipment.
5. Invert and air-dry the equipment, to prevent rust.

Source of Supplies

The office of the State extension dairyman will advise you as to where and how to obtain supplies, equipment, glassware, acid, etc.

Chapter IV. Weighing and Sampling Milk

Identification of Cows Being Milked

You must verify the identity of each cow when she enters the milking herd by comparing color markings, ear tags, and registration certificates and by recording the information on the individual cow record, form DHIA-22 (or DHIA-22A).

Thereafter, at each milking, you must check the records to be absolutely positive of the correct identity of each cow as she is milked.

Supervision of Milking

The cows being milked must be located so that you can effectively observe the milking at all times.

Weighing

You personally must weigh the milk produced in a 24-hour period by each cow in the herd. You personally must record the milk weights on the barn-book sheet, DHIA-2 (or DHIA-2A).

You should hang your scales at eye-level height at a place in the barn where you can observe all milking operations at all times. Adjust the red hand on the milk scale so that it will rest on zero with the empty but wet pail. Always read the red (adjusted) hand and record the milk weight to the nearest "tenth" of a pound.

Sampling

At each milking, pour the milk of each cow from one pail to another enough times (2 or 3 times) to insure that the milk is mixed thoroughly before you take a sample. The test will be more accurate if you use proportionate quantities from each milking to make up a composite sample for each cow. This is best done by placing a full sample dipper of milk from the first milking in the sample bottles and then varying the amount of milk added from the next milking according to the weight of the milk obtained from that milking. If the second milking is heavier than the first, add a full

dipper plus a little additional milk. If the second milking is lighter, add less than a full dipper of milk from that milking. The composite sample should always be large enough to run two tests if necessary.

Pipeline Milker With Weighing and Sampling Device

Check the scales in each milking unit for accuracy before milking. Be sure that the hand on the scale points to zero before the unit is attached to the cow.

Mix the milk thoroughly by bubbling air through the milk. To do this, open the sampling valve before the vacuum is released. First record the milk weight, then release the vacuum and take the sample.

Care of Milk Sample

Keep each cow's milk sample in a clean, tightly closed milk-sample jar. The number on the sample-jar lid should correspond with the sample number listed for the cow in the first column on the barn-book sheet. Keep the sample jars in a *locked* box or case.

Do not test sour or frozen samples of milk. In freezing weather, keep the samples in a warm place. In extremely hot weather, keep the samples in a cool place or use a preservative. Corrosive sublimate or potassium dichromate tablets may be used according to the directions of the manufacturer, to keep the samples from souring. *Caution: Preservatives are very poisonous and must be kept away from children and animals.* Milk samples that have been treated with preservatives and that are not used in making the test must be disposed of where children or animals cannot get to them.

Lock Sample Cases

To insure reliable records and to prevent outside criticism, you must keep all milk samples, glassware, and your supply of barn-book pages under lock and key at all times except when you are actually using them.

Chapter V. Testing Milk

The Babcock test is used in all dairy-herd-improvement associations. In using the Babcock test, follow the official rules adopted by the American Dairy Science Association.

Testing Whole Milk

Tempering

1. Place the bottles holding the composite milk samples in a water bath with the surface of the water slightly above the level of the milk in the bottles.

2. The temperature of the bath should not exceed 110° F. at the time you place the cold samples in it. Shortly thereafter, as the water bath cools off and the milk warms up, adjust the temperature of the bath so the final temperature of the bath and the samples is between 90° and 100°. You may use two baths, one for heating and one thermostatically controlled for holding at 90° to 100°. Do not shake or mix the milk in the sample bottle until it has reached 90°.

3. If any sample becomes diluted with water, discard it and make a permanent record of the date of the accident and identity of the sample.

4. If any cream adheres to the sides of the bottle and the stopper, gently rotate and invert the bottle to reincorporate the cream with the contents of the bottle.

Mixing Before Pipetting

After the composite sample of milk reaches 90° to 100° F., mix it in one of two ways:

1. Pour the sample into a mixing container and back into the original sample bottle at least twice. Drain the mixing container for at least 15 seconds before using it again.

2. If the sample bottle is not more than two-thirds full, you may mix the milk by shaking the bottle horizontally back and forth 6 times through a distance of about 6 inches within about 3 seconds, being careful to avoid churning the milk.

Pipet the sample immediately after mixing.

Temperature of Milk for Pipetting

1. When you pipet the sample, the temperature of the milk should be between 90° and 100° F.

Pipetting

1. Place the tip of the pipet into about one-half the depth of the milk in the sample bottle. Fill the pipet, and adjust the topmost surface of the milk to the graduated mark (17.6 cc.) on the suction tube. Insert the entire delivery tube of the pipet into the neck of the test bottle before releasing the milk. The lip of the test bottle should be vented, preferably with a

grooved rubber gasket at the base of the bulb of the pipet.

2. When the pipet has drained for about 10 or 15 seconds after free flow has stopped, blow out the last drops or remove the pipet from the test bottle with a quick upward movement to force the last drops from the tip of the pipet. You will find it advantageous to use two pipets alternately.

Testing Milk for Butterfat

Sulfuric Acid

1. Use sulfuric acid with a specific gravity of 1.82 to 1.83 at a temperature of 68° F.

2. The temperature of the acid should be between 65° and 75° F.

3. Use enough acid (not less than 14 ml.) so the fat column of the finished test will be clear and free of foreign material.

Adding Acid to the Milk

1. The temperature of the milk at the time of adding the acid should not exceed 80° F.

2. Hold the test bottle at an angle so the acid will flow down the sides of the bottle and add the acid slowly all at one time. Avoid blending the milk and acid until you begin actual mixing.

3. Start mixing the milk and acid gently, by rotating the test bottle until the curd disappears. Continue shaking the bottle for an additional period of at least 30 seconds. The time of shaking is very important in obtaining accurate tests. If you are using a preservative in the milk, mixing for 3 minutes is recommended.

4. Place the bottles in a heated centrifuge immediately after mixing the milk and acid.

Centrifuge

1. The centrifuge should be thermostatically controlled at 140° to 150° F. while in operation. An accurate thermometer should be permanently attached to the centrifuge in such manner that it will indicate the temperature in the area where the test bottles are whirled.

2. The centrifuge should be mechanically driven, free from vibration, at the following speeds:

Diameter of wheel (inches):	Minimum r. p. m. (number)
16.....	848
18.....	800
20.....	759
22.....	724
24.....	693

Diameter of wheel is the distance between the inside bottom of the opposite cups, measured through the center of rotation when the cups are extended hori-

zonally. This diameter must not be less than 16 inches. The speed of the centrifuge must not be less than the figures in the preceding table and must not exceed them by more than 40 r. p. m. Check the speed of the centrifuge at least monthly with the door of the tester closed. An accurate tachometer permanently attached to the centrifuge is desirable.

Centrifuging Procedure

1. Operate the centrifuge 5 minutes for the first period, 2 minutes for the second, and 1 minute for the third. Begin timing after it reaches operating speed. Use satisfactory timer.

2. As an alternative method, you may operate the centrifuge 5 minutes for the first period and 3 minutes for the second. This requires only one addition of water to bring the fat into the neck of the bottle.

3. Use water, free from oil, and at a temperature of at least 140° F., to fill the bulb and adjust the level of the fat column in the neck of the test bottle. To soften hard water, add about two drops of sulfuric acid to each quart of water. Never add water to acid.

4. Transfer the test bottles to the water bath immediately after the final centrifuging period.

5. When you read the test, the entire fat column must be within the graduated neck of the test bottle.

Tempering Baths

1. The temperature of the water in the bath should be between 130° and 140° F., preferably 135°.

2. Keep the water slightly above the top of the fat column of all test bottles.

3. Keep the test bottles in the water bath for a period of not less than 3 minutes.

4. Read the test immediately after you remove the bottle from the water bath.

Reading Tests

1. Hold the bottle vertically and at eye level in front of a source of indirect light to read the test. Use sharp needle-pointed dividers or calipers to make the measurement.

2. Measure the fat column in its entirety from the bottom of the lower meniscus to the top of the upper meniscus. (The meniscus is the saucershaped surface at the ends of the fat column. The bottom of the meniscus is the bottom of the saucer, and the top of the meniscus is the outer rim of the saucer.)

3. Measure the fat column on the ungraduated side of the neck and read the test from the graduated scale.

4. Read the fat test to the nearest 0.1 percent.

5. Do not read tests in which the fat column is foamy, burnt, or curdy.

Testing Skim Milk

The testing of skim milk for butterfat is useful in determining the amount of butterfat left in the skim

milk after the milk has been run through the cream separator. The skim-milk test bottle has two necks. One neck is of small bore and graduated to read the percentage of fat in hundredths, and the other, which extends almost to the bottom of the bottle, is of larger bore and conveys the acid and hot water used in the test. In testing skim milk, use a 17.5-cc. sample of milk, together with 20 cc. of sulfuric acid. Add the acid in two parts of 10 cc. each, and mix the acid and skim milk thoroughly after each addition. Continue the first whirling of the bottles in the centrifuge for 7 minutes, which is 2 minutes longer than in testing whole milk.

Defective Tests

The test is considered defective and inaccurate if the fat column is milky or indistinct or if flakes of casein or charred material are in or below the fat column, and you should repeat the test. The following items should be helpful in correcting procedures that result in defective tests:

A dark-colored or burned-fat column containing dark particles near the lower meniscus is usually caused by improper mixing or by one of the following:

1. The acid was too strong.

2. Too much acid was used.

3. The acid was too warm when it was added to the milk (over 75° F.).

4. The milk was too warm when the acid was added (over 80° F.).

5. The acid was dropped directly into the milk. (The test bottle should be tilted so the acid will flow down the sides.)

6. The mixing was interrupted before the solution was complete.

7. The acid and the milk stood too long before being mixed.

8. Too fast action of acid because of failure to use rotary motion in mixing milk and acid.

A light-colored fat column containing white curdy material or sediment near the lower meniscus may result from one or more of the following causes:

1. The acid was too weak.

2. Too little acid was used.

3. The acid was too cold when it was added to the milk (under 50° F.).

4. The milk was too cold when the acid was added (under 50° F.).

5. The mixing was not continued long enough to dissolve all the milk solids.

6. The speed of the centrifuge was insufficient.

Foam appearing on the top of the fat column in the test bottles, obliterating the upper meniscus, usually is caused by the use of hard water containing carbonates. You can usually remove the carbonates from the water before it is used by adding a few drops of sulfuric acid to the water and stirring vigorously to insure that the chemical reaction is completed. Never add water to acid.

Chapter VI. Calculating DHIA Records

You will do most of the work necessary in calculating DHIA records on the barn-book sheet, DHIA-2 (or DHIA-2A). Your State extension dairyman will advise you which of these two forms to use. The principal difference in the two forms is that form DHIA-2 provides space for recording the amount and cost of feed and returns above feed cost on an individual-cow basis, whereas form DHIA-2A provides space for this information on a herd basis. Copies of these forms properly filled out are shown in the appendix, figures 1 and 2.

Barn-Book, DHIA-2 (or DHIA-2A)

The barn book consists of work sheets, DHIA-2 (or DHIA-2A), on which you record production data for each cow, concentrates fed each cow, and roughage fed the herd for the monthly testing period. Later you transfer these data to the owner's herd-record book.

Make a carbon copy of the barn-book sheet. Leave the carbon copy with the herd owner at the close of the testing day so that he may have a copy of all data and calculations. In some States the original copy is sent to the office of the State extension dairyman and in other States it is filed in the county agent's office. Your State extension dairyman will tell you where to send the barn-book sheets.

You usually begin your testing day by filling out the headings of the barn-book sheet. The following paragraphs tell how to fill out the barn-book sheets properly.

Owner

Each month, write the name of the association, the herd identification number, and the name and address of the herd owner, or the name of the farm (if it has a name) on the heading of the barn-book sheet. If more than one sheet is needed to list all the cows in the herd, be sure to fill out the heading at the top of each sheet. Use the name that is used on page DHIA-1 in the herd-record book. (See ch. X, p. 21.) Use the same name, spelled exactly the same way, every month on all reports. Do not write "Will Smith" one month and "Bill Smith," "W. D. Smith," or "Smithdale Farm" some other month. If the ownership of a herd changes, give the names of both the old owner and the new owner. Example: W. D. Smith & Son, successors to W. D. Smith.

Testing Date

This is the date you finish the test on a farm. If you arrive at the farm in the afternoon of the 19th of the month, the day you leave—the 20th of the month—is the testing date. If it takes 2 days to test the herd and

you leave the farm on the 21st day of the month, the 21st is the testing date.

Enter the testing date (month, day, and year) in the space "Date tested" on the heading of the barn-book sheet, DHIA-2 (or DHIA-2A), as shown in the appendix, figs. 1 and 2.

Centering Date

Most cows decline in production as their lactation progresses. Therefore, they must be tested approximately in the middle of each month in order to get an accurate estimate of their production for that month. As all herds cannot be tested at the middle of each calendar month, a monthly testing period is established for each herd. To do this, a centering date is assigned to each herd the first month it is tested. Usually the date on which you test the herd the first month becomes the established centering date for the herd. The monthly testing period begins 15 days before the centering date and ends 12 to 15 days after the centering date, depending on the number of days in the month. Thus the centering date always falls about the middle of the testing period. In assigning centering dates you must consider your route and the location of the herd in relation to other herds in the circuit.

Once you have established a centering date for a herd, it remains the same month after month even though you do not test the herd on exactly this date each month. You should vary your visits to each farm so that succeeding testing dates will be as much as 3 days before or 3 days after the established centering date. Unless you change your route, the herd will have the same centering date year after year. If you assume your duties in an association in operation, use the centering date already established for each herd. In a new association without a full membership at the time testing is started, leave several "open" centering dates in your schedule for new members who join the association later.

Give large herds that cannot be tested in 1 day only 1 centering date for the entire herd. If it takes 2 days to test the herd, the second day is the centering date; if it takes more than 2 days, the day near the middle of the test is the centering date.

Enter the same established centering date for the herd each month in the space provided on the heading of the barn-book sheet, DHIA-2 (or DHIA-2A).

New Herds Coming Into Association During Testing Year

Frequently a new herd coming into an association during the year is located so that, to avoid unnecessary travel, you should test the herd at a time in the month in which all the centering dates have been assigned. However, since you have a range of 7 days (3 days be-

fore, on, and 3 days after the centering date) in which to test a herd, you usually can assign a centering date to a new herd even though it may result in two herds in the same association having the same centering date. When the next association year begins, you may re-assign the centering date for the various herds if necessary. (See ch. IX, p. 19.)

Monthly Testing Period

To calculate records correctly, you must understand and remember that you are calculating feed and production records for a testing period, not for a calendar month or months, and that the testing period for each herd varies with each centering date.

After the centering date is established for a herd, you can easily determine the testing period for each monthly test by referring to the table on page 11. This table is printed also on the inside cover of the barn book. (If the association operates on the bimonthly testing plan, use the table on p. 12 to determine the inclusive dates of, and the number of days in, the bimonthly testing period.)

Each month, after you have entered the established centering date for the herd on the barn-book sheet, refer to the table on the inside cover of the barn book, (or, in the bimonthly testing plan, to the table on p. 12) to obtain the inclusive dates for the corresponding testing period. Enter the correct dates (month, day, and year) in the space "Testing period from ----- to -----" on the heading of the barn-book sheet, DHIA-2 (or DHIA-2A).

You will refer to the inclusive dates of the testing period many times while you are calculating records on each farm. With these dates available on the barn-book sheet for easy reference, it will not be difficult to calculate the correct number of days for cows in milk or cows coming into or leaving the milking herd during the testing period.

Days in Testing Period

If the association operates on the monthly testing plan, the number of days in the testing period is the same as the number of days in the calendar month in which the centering date falls. (If the association operates on the bimonthly testing plan, the number of days in the testing period is the number of days in the month in which the centering date falls plus the number of days in the preceding month.) However, it is not necessary for you to calculate the number of days in the testing period as this information is given in the table on the inside cover of the barn book (or, in the bimonthly plan, in the table on p. 12). You should always refer to these tables rather than trust your memory as to the number of days in the various testing periods.

Enter the number of days in the testing period in the space provided on the heading of the barn-book sheet DHIA-2 (or DHIA-2A).

Sample Number

Number the sample-bottle caps permanently from 1 to 24, or from 1 to 48 (depending on the number of sample bottles you carry in your testing outfit).

Enter in the column "Sample No." on the barn-book sheet, DHIA-2 (or DHIA-2A), numbers to correspond with the numbers on the sample-bottle caps.

Cow's Name and Eartag or Registration Number

On your first visit to the farm, check form DHIA-22 (or DHIA-22A) in the herd-record book to determine if the name and eartag or registration number together with the barn name and number of each cow in the milking herd have been recorded. With the owner, make any necessary corrections or additions, including new cows entering the herd. Once you have recorded all this information in the herd-record book, you usually will be able to identify the cows and keep the records in order on the barn-book sheet, DHIA-2 (or DHIA-2A), month after month with just the barn names and numbers.

Each time you visit the farm, before milking starts in the evening, list in the column "Cow's name and eartag or registration No." on the barn-book sheet, DHIA-2 (or DHIA-2A), the barn names or numbers of all the cows, milking and dry, that are in the herd. List the cows in the same order each month. This makes it easy to keep track of cows taken from or added to the herd.

Every cow in the herd that has ever freshened, regardless of her stage of lactation (dry cow, nurse cow, or milking cow) and regardless of her ownership, must be listed on the barn-book sheet. No cow may be left out. List nurse cows as dry cows, unless you obtain daily milk weights and samples on the testing date. (See ch. IX, p. 18.)

Cow-Days Dry and Total Cow-Days on Test

Enter in the column with the subheading "On test" the actual number of days that each cow is in the herd during the testing period; enter in the column with the subheading "In milk" the number of days each cow is actually in milk; and enter in the column with the subheading "Dry" the number of days, if any, each cow is dry.

For cows in the herd every day in the testing period, the number of days on test is the same as the number of days in the testing period. Most of the cows will also be in milk every day in the testing period.

Record the number of days each cow is dry during the testing period in the column "Dry" as shown for the three cows 51-WAA-4817 Susie, 51-WAA-4838 Sol, and 51-WAA-4826 Marge in the appendix, figures 1 and 2.

Milk Weights

In the first column under the general heading "Milk" on the barn-book sheet, DHIA-2 (or DHIA-2A), space is provided for recording separately the weights of two milkings for each cow. Record only milk weights you obtain personally. If the owner keeps daily weights, they are for the owner's use only.

Record each cow's daily milk weight in pounds and tenths. Round the figures for monthly milk weight to the nearest 10 pounds, and the month's butterfat weight to the nearest pound.

Record the night's milk weight above the middle line of the section and the morning's milk weight below, as shown in the appendix, figures 1 and 2. In the "Total" column, record the sum of the milk weights in the preceding column. In the next column record the "Monthly total." To obtain the "Monthly total," multiply the "Daily total" by the number of days the cow was in milk during the testing period.

Centering Date Table—Monthly

Centering date	January, August (31 days)	February (28 days)	February (29 days)	March (31 days) following February (28 days)	March (31 days) following February (29 days)	April, June, September, November (30 days)	May, July, October, December (31 days)	Centering date
1st-----	*17 to 16	*17 to 13	*17 to 14	*14 to 16	*15 to 16	*17 to 15	*16 to 16	-----1st
2d-----	*18 to 17	*18 to 14	*18 to 15	*15 to 17	*16 to 17	*18 to 16	*17 to 17	-----2d
3d-----	*19 to 18	*19 to 15	*19 to 16	*16 to 18	*17 to 18	*19 to 17	*18 to 18	-----3d
4th-----	*20 to 19	*20 to 16	*20 to 17	*17 to 19	*18 to 19	*20 to 18	*19 to 19	-----4th
5th-----	*21 to 20	*21 to 17	*21 to 18	*18 to 20	*19 to 20	*21 to 19	*20 to 20	-----5th
6th-----	*22 to 21	*22 to 18	*22 to 19	*19 to 21	*20 to 21	*22 to 20	*21 to 21	-----6th
7th-----	*23 to 22	*23 to 19	*23 to 20	*20 to 22	*21 to 22	*23 to 21	*22 to 22	-----7th
8th-----	*24 to 23	*24 to 20	*24 to 21	*21 to 23	*22 to 23	*24 to 22	*23 to 23	-----8th
9th-----	*25 to 24	*25 to 21	*25 to 22	*22 to 24	*23 to 24	*25 to 23	*24 to 24	-----9th
10th-----	*26 to 25	*26 to 22	*26 to 23	*23 to 25	*24 to 25	*26 to 24	*25 to 25	-----10th
11th-----	*27 to 26	*27 to 23	*27 to 24	*24 to 26	*25 to 26	*27 to 25	*26 to 26	-----11th
12th-----	*28 to 27	*28 to 24	*28 to 25	*25 to 27	*26 to 27	*28 to 26	*27 to 27	-----12th
13th-----	*29 to 28	*29 to 25	*29 to 26	*26 to 28	*27 to 28	*29 to 27	*28 to 28	-----13th
14th-----	*30 to 29	*30 to 26	*30 to 27	*27 to 29	*28 to 29	*30 to 28	*29 to 29	-----14th
15th-----	*31 to 30	*31 to 27	*31 to 28	*28 to 30	*29 to 30	*31 to 29	*30 to 30	-----15th
16th-----	1 to 31	1 to 28	1 to 29	1 to 31	1 to 31	1 to 30	1 to 31	-----16th
17th-----	2 to 1**	2 to 1**	2 to 1**	2 to 1**	2 to 1**	2 to 1**	2 to 1**	-----17th
18th-----	3 to 2**	3 to 2**	3 to 2**	3 to 2**	3 to 2**	3 to 2**	3 to 2**	-----18th
19th-----	4 to 3**	4 to 3**	4 to 3**	4 to 3**	4 to 3**	4 to 3**	4 to 3**	-----19th
20th-----	5 to 4**	5 to 4**	5 to 4**	5 to 4**	5 to 4**	5 to 4**	5 to 4**	-----20th
21st-----	6 to 5**	6 to 5**	6 to 5**	6 to 5**	6 to 5**	6 to 5**	6 to 5**	-----21st
22d-----	7 to 6**	7 to 6**	7 to 6**	7 to 6**	7 to 6**	7 to 6**	7 to 6**	-----22d
23d-----	8 to 7**	8 to 7**	8 to 7**	8 to 7**	8 to 7**	8 to 7**	8 to 7**	-----23d
24th-----	9 to 8**	9 to 8**	9 to 8**	9 to 8**	9 to 8**	9 to 8**	9 to 8**	-----24th
25th-----	10 to 9**	10 to 9**	10 to 9**	10 to 9**	10 to 9**	10 to 9**	10 to 9**	-----25th
26th-----	11 to 10**	11 to 10**	11 to 10**	11 to 10**	11 to 10**	11 to 10**	11 to 10**	-----26th
27th-----	12 to 11**	12 to 11**	12 to 11**	12 to 11**	12 to 11**	12 to 11**	12 to 11**	-----27th
28th-----	13 to 12**	13 to 12**	13 to 12**	13 to 12**	13 to 12**	13 to 12**	13 to 12**	-----28th
29th-----	14 to 13**	14 to 13**	14 to 13**	14 to 13**	14 to 13**	14 to 13**	14 to 13**	-----29th
30th-----	15 to 14**	15 to 14**	15 to 14**	15 to 14**	15 to 14**	15 to 14**	15 to 14**	-----30th
31st-----	16 to 15**	16 to 15**	16 to 15**	16 to 15**	16 to 15**	16 to 15**	16 to 15**	-----31st

*Date of previous month.

**Date of following month.

Computing the Butterfat

After you have found the percentage of butterfat in the composite sample of milk for each cow, by means of the Babcock test, record the result in the "Butterfat" column on the barn-book sheet, DHIA-2 (or DHIA-2A) under the subheading "Percentage," as shown in the appendix, figures 1 and 2. Multiply the total pounds of milk produced during the monthly testing period by the percentage of butterfat, to obtain the butterfat produced during the period, and record this figure (to the nearest pound) under the subheading "Pounds" in the "Butterfat" column.

If you do not make the calculation on a calculating machine, use computing tables. You can obtain computing tables from the office of your State extension dairyman.

Price and Value of Product

Record the price received for the product on the farm (market price less transportation charges) in the space "Price" in the heading of the column "Value of product" on the barn-book sheet, DHIA-2 (or DHIA-2A), as shown in the appendix, figures 1 and 2. Calculate the value of product to the nearest 10 cents.

Several methods of determining price and value of product are described in the following paragraphs.

You should follow the advice of your State extension dairyman in regard to the method you use.

Whole Milk

If whole milk is sold according to the butterfat content of the milk with butterfat price differentials or at different base and surplus prices, determine the price as follows: Use the average price received for whole milk to calculate the price received per pound of butterfat, then use the price per pound of butterfat to determine the value of the product of each cow. For example, in the appendix, figures 1 and 2, this procedure was used to calculate value of product. The average price received for whole milk divided by the percentage of fat in the milk ($\$4.63 \div 4.1$) equals \$1.13, which is the price per pound of butterfat. To obtain the value of product, multiply the pounds of fat produced by each cow by the price per pound of butterfat.

Another method of calculating the value of product of individual cows is to multiply the average price per hundredweight received for milk by the number of pounds of milk produced by each cow, disregarding test or butterfat.

In some associations, dairymen like to have the value of product of each cow calculated according to milk price and butterfat content. Your State extension dairyman will give you detailed instructions if you use this method of computing value of product with butterfat content price differentials. Compute the value of product of each individual cow accordingly.

Centering Date Table—Bimonthly

Centering date	January (62 days)	February (59 days)	March (59 days)	April, June, Sept., Nov. (61 days)	May, July, Oct., Dec. (61 days)	August (62 days)	Centering date
1st	*1 to 31	*1 to 28	*1 to 30	*1 to 30	*1 to 31	*1 to 31	1st
2d	*2 to 1**	*2 to 1**	*2 to 1**	*2 to 1**	*2 to 1**	*2 to 1**	2d
3d	*3 to 2**	*3 to 2**	*3 to 2**	*3 to 2**	*3 to 2**	*3 to 2**	3d
4th	*4 to 3**	*4 to 3**	*4 to 3**	*4 to 3**	*4 to 3**	*4 to 3**	4th
5th	*5 to 4**	*5 to 4**	*5 to 4**	*5 to 4**	*5 to 4**	*5 to 4**	5th
6th	*6 to 5**	*6 to 5**	*6 to 5**	*6 to 5**	*6 to 5**	*6 to 5**	6th
7th	*7 to 6**	*7 to 6**	*7 to 6**	*7 to 6**	*7 to 6**	*7 to 6**	7th
8th	*8 to 7**	*8 to 7**	*8 to 7**	*8 to 7**	*8 to 7**	*8 to 7**	8th
9th	*9 to 8**	*9 to 8**	*9 to 8**	*9 to 8**	*9 to 8**	*9 to 8**	9th
10th	*10 to 9**	*10 to 9**	*10 to 9**	*10 to 9**	*10 to 9**	*10 to 9**	10th
11th	*11 to 10**	*11 to 10**	*11 to 10**	*11 to 10**	*11 to 10**	*11 to 10**	11th
12th	*12 to 11**	*12 to 11**	*12 to 11**	*12 to 11**	*12 to 11**	*12 to 11**	12th
13th	*13 to 12**	*13 to 12**	*13 to 12**	*13 to 12**	*13 to 12**	*13 to 12**	13th
14th	*14 to 13**	*14 to 13**	*14 to 13**	*14 to 13**	*14 to 13**	*14 to 13**	14th
15th	*15 to 14**	*15 to 14**	*15 to 14**	*15 to 14**	*15 to 14**	*15 to 14**	15th
16th	*16 to 15**	*16 to 15**	*16 to 15**	*16 to 15**	*16 to 15**	*16 to 15**	16th
17th	*17 to 16**	*17 to 16**	*17 to 16**	*17 to 16**	*17 to 16**	*17 to 16**	17th
18th	*18 to 17**	*18 to 17**	*18 to 17**	*18 to 17**	*18 to 17**	*18 to 17**	18th
19th	*19 to 18**	*19 to 18**	*19 to 18**	*19 to 18**	*19 to 18**	*19 to 18**	19th
20th	*20 to 19**	*20 to 19**	*20 to 19**	*20 to 19**	*20 to 19**	*20 to 19**	20th
21st	*21 to 20**	*21 to 20**	*21 to 20**	*21 to 20**	*21 to 20**	*21 to 20**	21st
22d	*22 to 21**	*22 to 21**	*22 to 21**	*22 to 21**	*22 to 21**	*22 to 21**	22d
23d	*23 to 22**	*23 to 22**	*23 to 22**	*23 to 22**	*23 to 22**	*23 to 22**	23d
24th	*24 to 23**	*24 to 23**	*24 to 23**	*24 to 23**	*24 to 23**	*24 to 23**	24th
25th	*25 to 24**	*25 to 24	*25 to 24**	*25 to 24**	*25 to 24**	*25 to 24**	25th
26th	*26 to 25**	*26 to 25**	*26 to 25**	*26 to 25**	*26 to 25**	*26 to 25**	26th
27th	*27 to 26**	*27 to 26**	*27 to 26**	*27 to 26**	*27 to 26**	*27 to 26**	27th
28th	*28 to 27**	*28 to 27**	*28 to 27**	*28 to 27**	*28 to 27**	*28 to 27**	28th
29th	*29 to 28**		1 to 28**	*29 to 28**	*29 to 28**	*29 to 28**	29th
30th	*30 to 1 ¹		2 to 29**	*30 to 29**	*30 to 29**	*30 to 29**	30th
31st	*31 to 2 ¹		3 to 30**		1 to 30**	*31 to 30**	31st

*Date of previous month.

**Date of following month.

¹ Date of second following month.

If milk is sold at both base and surplus prices, calculate the average price as follows: Suppose 20 percent of the milk is sold at a surplus price of \$3 per 100 pounds and the remaining 80 percent is sold at a base price of \$4.50 per 100 pounds. The average price is $(\$3.00 \times 0.20) + (\$4.50 \times 0.80)$, or \$4.20. Use this average price in calculating butterfat differential price, as indicated above.

If whole milk is sold by the gallon or quart, convert the gallon or quart price to price per 100 pounds. Then multiply the amount of milk produced by the price per 100 pounds (a gallon of milk weighs approximately 8.6 pounds), to obtain the value of product.

When milk is bottled and sold to the retail trade, use about 60 percent of the selling price in calculating the price of the whole milk on a gallon or quart basis. Disregard the remaining 40 percent of the retail price, which is considered as cost of delivery.

Butterfat and Skim Milk

When milk is separated on the farm and the cream and skim milk are sold separately, include the value of the butterfat and the value of the skim milk in the column "Butterfat-Milk" under the general heading "Value of product." Record the sum of these two values in the "Total" column under the general heading "Value of product."

Usually, however, when milk is separated, only the cream is sold and the skim milk is fed on the farm. In such cases, the value of the skim milk must be included in the total value of the product or the cows will not receive full credit for the product produced.

To keep the number of calculations at a minimum, convert the price of skim milk to a butterfat basis and add its value to the price per pound of butterfat; then calculate the total value of product as outlined under "Whole Milk." For example, Iowa has found it practical to determine the value of skim milk according to substitute feed value on the basis that 10 pounds of skim milk is equal in value to 1 pound of linseed meal, as follows:

Using the factor below, multiply the factor that corresponds to the "average percentage of butterfat" for the entire herd by the cost of 1 pound of linseed meal. The product of this multiplication represents the value of skim milk on a butterfat basis in cents. Add this figure to the price of butterfat to complete the total value of product in one operation.

Average percentage of butterfat:

	Factor
3.00 and under	3.00
3.01 to 3.50	2.78
3.51 to 4.00	2.40
4.01 to 4.50	2.12
4.51 to 5.00	1.90
5.01 and over	1.80

Example: Suppose the average butterfat test for the herd is 4 percent and suppose the price of linseed meal is \$5 per cwt., or 5 cents per pound. Multiply the factor in the above table for 4 percent (2.40) by the price of 1 pound of linseed meal (5 cents); the value of skim milk on a butterfat basis would be 2.40×5 , or 12 cents. (If the result is in fractions, compute to the nearest cent.)

If the price of butterfat is 80 cents, add 12 cents and use the sum of $80+12$, or 92 cents, to calculate the total value of product as outlined under "Whole Milk." Make a notation on the barn-book sheet such as "Butterfat price increased 12 cents to include value of skim milk" to show the procedure followed in calculating the total value of product.

Daily and Monthly Feed Amounts

Two different plans for calculating and recording feed data are offered. Both plans provide for calculating concentrate feed records on an individual-cow basis. One plan provides for calculating roughage records on an individual-cow basis whereas the other plan provides for calculating roughage records on a herd basis. Your State extension dairyman will advise you which plan to follow in your association.

Calculating and recording feed records is discussed in chapter VIII.

Remarks

Enter in this column important notes and data that you must have available if you are to calculate the production records correctly and completely. The notes include dates (such as breeding dates, calving and dry dates), and other items (such as sickness, etc.) that may affect the record. Eartag numbers of calves may be recorded in this column, as shown in the appendix, figures 1 and 2.

Monthly Herd Totals

After you have made all computations and have completely filled in each individual cow-record on the barn-book sheet for the testing period, add the milk and butterfat records for the individual cows to obtain the totals for the herd. Record these totals at the bottom of the page, as shown in the appendix, figures 1 and 2.

Add the number of days each cow was on test during the testing period to obtain the "Total cow-days on test," and record as shown.

Divide the "Total cow-days on test" by the number of days in the testing period to obtain the number of "Cow-months," and record as shown. Example: In the appendix, figures 1 and 2, the number 403 is divided by 31 to obtain the figure 13.0, the "Cow-months."

Add the number of days in the column "In milk" to obtain the total for the herd, and record as shown.

Add the number of days each cow was dry during the testing period to obtain the total number of "Cow-days dry," and record as shown.

Monthly Herd Average

You must include all cows in the herd when you calculate the herd averages. To obtain the monthly herd averages, divide the herd totals by the number of "cow-months." Example: In the appendix, figures 1 and 2, the monthly totals for the herd are divided by 13.0 (the number of cow-months) to obtain the monthly herd averages. To obtain the average butterfat test for the herd, divide the average fat per cow by the average milk per cow. Example: In the appendix, figures 1 and 2, $22.5 \div 554 = 0.0406$, or 4.06 percent average butterfat test for the herd.

Checking Barn-Book Calculations

Check carefully for accuracy all calculations made on the barn-book sheet each month. You can make a general check on the accuracy of your calculations as follows: To check total value of product, multiply the total pounds of milk or butterfat for the testing period by the price of the product. The results may vary a few cents from the sum of individual records because of fractions. If the results do not check closely, there are mistakes either in the column totals or in the records of one or more individual cows.

Chapter VII. Calculating Records for Testing Period

You must credit each individual cow with the correct number of days on test, in milk, and dry in each testing period if her production and feed records are to be correct for the testing period, for the year, and for her lactation period.

Remember that you are calculating records for a testing period and that you have already recorded on the heading of the barn-book sheet the inclusive dates of the testing period and the number of days in the period. (See ch. VI, p. 9.)

You have entered in the column with the subheading "On test" the actual number of days that each cow is in the herd during the testing period, in the column with the subheading "In milk" the number of days each cow is actually in milk; and in the column with the subheading "Dry" the number of days, if any, each cow is dry.

You will recall that for cows in the herd every day in the testing period, the number of days on test is the same as the number of days in the testing period.

However, there usually are some cows that are not in milk every day. These are cows freshening or drying off during the testing period, or milking cows that were purchased and brought into the herd or that were sold from the herd during the period. Under DHIA testing, heifers are not considered a part of the herd until they calve.

Fresh Cows

The record of a fresh cow begins on the fourth day after calving, counting the calving day as the first day, but her milk is not tested earlier than the seventh day after calving, counting the calving day as the first day. For example, if a cow freshens on the 21st of the month, her record begins on the 24th, but do not test her milk before the 27th. You can take the first milk weights and samples on the evening of the sixth day after calving, or, in this example, on the evening of the 26th.

If a cow has not been fresh 6 days before the testing date, do not calculate her production for that testing period until your next visit to the farm. For an example of how to calculate the record of a fresh cow, refer to the barn-book sheet, DHIA-2 (or DHIA-2A) in the appendix, figures 1 and 2. The third cow listed, 51-WAA-4817 Susie, freshened October 9. (The calf was a male and was cartagged 51-WAA-4967, as noted in the righthand column headed "Remarks.") To calculate Susie's record, refer to the inclusive dates of the testing period, on the heading of the barn-book sheet; note that the testing period is from October 5 through November 4. Susie freshened on October 9, and her production record begins on October 12.

Calculate only her actual production from October 12 through November 4, or 24 days; but calculate her feed consumption for the entire testing period of October 5 through November 4, or 31 days, as she was in the herd and was fed for the entire testing period. Record the number of days she was not in milk (7) in the "Dry" column.

First-calf heifers are started on test on the fourth day after calving counting the calving day as the first

day. If Susie were a first-calf heifer, you would calculate both her production and her feed records for 24 days, as that would be the number of days she was a part of the milking herd during the testing period. (For testing purposes, heifers are not considered part of the herd until they calve.) You would record the figure 24 in the column "On test" and also in the column "In milk."

Sometimes a dry cow comes into milk before she freshens. This prefreshening production is included in her lifetime record on form DHIA-22 (or DHIA-22A), but it is not counted as part of her lactation record, which begins at freshening as outlined above.

Record the weight of each fresh cow in the "Remarks" column of form DHIA-2 (or DHIA-2A) and on form DHIA-22 (or DHIA-22A). Use the tape measure in your supervisor's testing outfit to estimate the cow's weight.

Purchased Cows

Calculate production and feed records for purchased cows in milk coming into the herd the same as records for first-calf heifers. Both feed and production records begin the first full day a cow is in the herd.

Calculate feed records for a purchased dry cow for the number of days the cow is in the herd during the current testing period. If the purchased dry cow freshens during the same testing period in which she is purchased, calculate her production record for the number of days she is in milk during the testing period.

If a purchased cow in milk comes into the herd and she has freshened not more than 30 days before the beginning of her first testing period, estimate her production for the period preceding her first testing period.

Milk production for the first and second months of a lactation period are approximately equal. (See ch. IX, p. 18.) Therefore, use the data you obtain on her first testing day to calculate her production for the preceding testing period. Enter on form DHIA-22 (or DHIA-22A) the estimated record for the testing period preceding the period in which you make her first test, and make a note in the "Remarks" column, as "9 days' record estimated."

With your special tape measure, estimate the weight of each purchased cow as she enters the milking herd and record it on DHIA-2 (or DHIA-2A) and on DHIA-22 (or DHIA-22A).

Dry Cows

The dry date is the first day the cow is not milked. Do not count in the record the date or day the cow goes dry. You and the owner should agree on a date when a cow is turned dry, and you calculate her production record accordingly. Charge cows that are dry during the entire testing period with the feed consumed during the testing period. (See the record of cow 51-WAA-4826 Marge on the barn-book sheet, DHIA-2 (or DHIA-2A) in the appendix, figs. 1 and 2.)

Charge cows that are dry on the testing date but that were in milk for some of the testing period for feed

consumed for the full testing period, but give them production credit for only the number of days they were actually in milk from the beginning of the testing period up to and including the last day milked. As you cannot obtain milk weights and samples during the current testing period, you calculate the cow's production credit on the basis of daily weights and tests you obtained for her and recorded on form DHIA-22 (or DHIA-22A) in the herd-record book the previous month. This procedure is often referred to as calculating "forward" credit from a previous test.

Cow 51-WAA-4838 Sol, listed on the barn-book sheet, DHIA-2 (or DHIA-2A) in the appendix, figures 1 and 2, illustrates the production record of a cow that was dry on the testing date but that was in milk for part of the testing period. The inclusive dates of the testing period are October 5 through November 4; the testing date is October 20; and the cow was dry October 16. Give the cow production credit from October 5 through October 15, or 11 days, and calculate the 11 days' production credit on the basis of her daily weights and tests for the previous month, which are recorded on DHIA-22 (or DHIA-22A).

Charge cows that are in milk on the testing date but that will be turned dry before the end of the testing period for feed consumed for the full testing period but give them production credit for only the number of days in milk.

Cows Sold

If a cow in milk is sold during the testing period, give her production credit and charge her for feed consumed for the actual number of days she was in the herd within the inclusive dates of the testing period. Include in the record her production on the day she leaves the herd.

If a cow is sold before the testing date, calculate her production and feed records for the number of days she was in the herd on the basis of the daily weights and tests you obtained and recorded the previous month on form DHIA-22 (or DHIA-22A).

If a cow is still in the herd but the owner knows he is going to sell her within the inclusive dates of the testing period, he should tell you the date he expects the cow to leave the herd, and you calculate her record accordingly.

If a cow is sold that is dry during the entire testing period, charge her with feed consumed for the actual number of days she was in the herd during the testing period.

Calculate feed and production records for cows that die during a testing period in the same way as for cows sold.

Aborting Cows

Aborting cows are not tested until the seventh day after aborting.

If a cow aborts while dry, calculate her record in the same way as for a fresh cow.

If a cow aborts while in milk after carrying a calf 152 days, her current record ends and a new lactation begins. Calculate her production for that part of the testing period previous to the abortion on the basis of her last test prior to the abortion. There should be a lapse of 3 days, and you calculate her production for the remainder of the testing period on the basis of her first test after this 3-day period. Make a note of these

facts in the "Remarks" column on the barn-book sheet, DHIA-2 (or DHIA-2A); on form DHIA-22 (or DHIA-22A) in the herd-record book; and on form DHIA-718.

If the cow that aborts while in milk cannot be tested on the testing date, credit her on the barn-book sheet, DHIA-2 (or DHIA-2A), for production to the day she aborts, based on her previous test, and consider her dry for the remainder of the testing period in computing monthly herd averages. On the next testing date, give her "back" credit for production that should be included in the testing period in which she aborted.

If a cow aborts after the testing date but before the end of the testing period, you have already calculated her production for the period and have recorded it on form DHIA-22 (or DHIA-22A). When you record her production for the next testing period, correct the totals and make a suitable notation in the "Remarks" column.

Cows Freshening Without Going Dry

If a cow freshens without going dry, calculate her production record in the same way as for a cow that aborts while in milk.

Crediting Records to Correct Testing Period

The production records of cows freshening or going dry, purchased cows in milk, or cows in milk leaving the herd during a testing period usually require special calculations to give the cows the correct production credit for the current or previous testing period.

Example: Suppose you make your regular visit to a farm on September 19. On September 23, the owner purchases and brings into the herd a cow in milk, 51-WAA-4828 Jane. When you visit the farm again (October 20) you obtain data for calculating records for the testing period October 5 through November 4. (See the appendix, figs. 1 and 2.) Take milk weights and samples and calculate production and feed records for Jane for the October testing period in the usual manner. Another calculation is necessary, however, to include milk she produced in the previous testing period from September 24 (date her record in the herd began) through October 4 (end of previous testing period). The number of days from September 24 through October 4, is 11. Calculate her production record for 11 days on the basis of weights and tests you obtain on the October testing date. Then enter the 11-day record, often referred to as "back" credit, on a separate line in the barn book and circle the entire record as a reminder not to add it in the current testing period totals.

For a cow in the herd that freshens after the testing date but before the end of the testing period, the procedure is similar.

Example: See the record of cow 51-WAA-4821 Rosni, in the appendix, figures 1 and 2. Rosni was dry on the September testing date. She freshened September 25, and her record began September 28. This was after the September testing date, but before the end of the September testing period. She had 7 days' production in the previous testing period (September 28 through October 4). To complete her record and bring it up to date, use weights and tests you obtain on the October testing date to calculate her production for the previous testing period.

Circle this 7-day "back credit" record as a reminder not to add it in the totals for the current testing period.

Chapter VIII. Feed Reports

As indicated in the preceding chapter, you will calculate and record feed data according to one of two plans. The principal difference in the two plans is that in one you calculate roughage records on an individual-cow basis and in the other, on a herd basis.

If you calculate and record roughage records on an individual-cow basis, use forms DHIA-2 and DHIA-22, as shown in the appendix, figures 1 and 3.

If you calculate and record roughage records on a herd basis, use forms DHIA-2A and DHIA-22A, as shown in the appendix, figures 2 and 4.

Your State extension dairyman will advise you which plan to follow in your association.

Back of Barn-Book Sheet, DHIA-2 (or DHIA-2A)

The back of the barn-book sheet is in reality a work sheet on which you record and calculate roughage and feed costs for the testing period. (See the appendix, figs. 1 and 2.)

Fill out the form completely each month. Record the name, amount, quality, and price of roughages and concentrates used in calculating the cost of feed.

Names of Feed

Record definite names of succulent and dry roughage, individual grains and feed supplements, as shown in the appendix, figures 1 and 2. If a home mixture of grains and supplements is fed, record it as "Home Mix" and give the percentage of total or crude protein. If a commercial mixture is fed, record it as "Com. Mix" and give the percentage of total or crude protein.

Grains and Concentrates

Weigh or measure carefully the amount of grain and concentrates fed each cow on the testing date, to determine accurately the amount each cow consumes daily.

Record the amount consumed daily (to the nearest pound) in the space provided, as shown in the appendix, figures 1 and 2.

Calculate Grain and Concentrate Records for the Testing Period

To determine the total weight of concentrates consumed by each cow during the testing period, multiply the daily weight of grain and concentrates fed the cow by the number of days she was in the herd during the testing period. Obtain this number from the column "On test." Calculate grain or concentrate records for the number of days the cow is on test, not just those days she is in milk. Example: In the appendix, figures 1 and 2, the cow Susie's feed record is for the entire testing period of 31 days. The same is true

for cow 51-WAA-4838 Sol and also for the dry cow 51-WAA-4826 Marge, even though Marge has no production record.

Record the total amount of grain or concentrates consumed in the testing period by each cow (to the nearest 10 pounds) in the space provided.

Roughage

The amount of succulent and dry roughage consumed by individual cows is frequently difficult to determine. If it is impractical to obtain actual weights of roughage fed individual cows, first determine the total amount consumed by the herd and then either divide this uniformly among all the cows or prorate it according to the weight of the individual cows.

By checking closely with the dairyman, you usually can determine quite accurately the total amount of roughage consumed by the herd. Hay often is baled. Multiply the number of bales fed daily by the average weight of the bales to obtain the total daily weight of hay fed. In the same way, multiply the number of baskets, carts, or carriers of silage fed daily by the average weight of the baskets, etc., to obtain the total daily weight of silage fed.

Then, prorate it among the herd according to the weight of each cow or, as in the appendix, figures 1 and 2, divide the total roughage by the number of cows in the herd and make a uniform charge for roughage for each cow.

Indicate the quality of each kind of roughage according to the grades described below:

Grades of Roughage and Pasture

The various grades of roughage and pasture are as follows:

Hay

Excellent: Early-cut legume, grass, or mixed hay (legumes cut at $\frac{1}{4}$ -bloom stage and grasses in the before-heading stage), either barn dried or cured in the field under ideal haymaking weather. Excellent hay is green and leafy, with high palatability, and is free from mold, mustiness, and foreign material.

Good: Legume, grass, or mixed hay cut reasonably early (legumes cut not later than the $\frac{1}{2}$ -bloom stage and grasses in the early heading stage), either barn dried or cured in the field without leaf loss in good haymaking weather. Good hay is reasonably green and leafy, high in palatability and free from mold, mustiness, and foreign material.

Fair: Legume, grass, or mixed hay cut late (full bloom) with loss of leaves due to maturity; field cured in good haymaking weather. Early cut hay ($\frac{1}{4}$ -bloom) field cured in unfavorable haymaking weather. Fair hay lacks bright color, is coarse stemmed, is not very palatable, and, if cured under unfavorable haymaking weather, may be moldy and dusty.

Poor: Any hay cut after the full bloom stage, or early cut hay ($\frac{1}{4}$ - to $\frac{1}{2}$ -bloom) harvested under adverse conditions with severe weather or storage damage. Poor hay is dark or bleached in color, lacks leaves, is coarse stemmed, and is not palatable. Livestock will pick over the hay for better portions and waste considerable amounts. The hay may be moldy and dusty.

Silage

Excellent: Corn silage harvested at the well-dented dough stage of maturity and heavily eared. Hay-crop silage cut early ($\frac{1}{4}$ -bloom or early bloom stage), and wilted before storage or stored unwilted with a preservative (molasses or grain). Excellent silage has no mold or spoilage and is relished by livestock.

Good: Corn silage harvested at the well-dented dough stage of maturity and moderately eared. Hay-crop silage cut reasonably early (before the $\frac{1}{2}$ -bloom stage or in the heading stage), and either wilted before storage or stored unwilted with a preservative. Good silage has little or no mold or spoilage and is eaten readily by livestock.

Fair: Corn silage harvested in milk stage of maturity, fair in ears; mature corn silage with mold and spoilage. Hay-crop silage cut late ($\frac{1}{2}$ - to full-bloom stage) and either wilted before storage or stored unwilted with no preservative. Corn or hay-crop silage harvested at proper stage of maturity but with considerable mold and spoilage so that livestock do not relish it.

Poor: Corn silage made from immature corn (blister stage) and sparsely eared. Silage made from sweet corn, cannery refuse, or corn stalks with ears removed. Hay-crop silage cut late (full-bloom stage or later), and stored with no preservative, dry and fluffy. Corn or hay-crop silage harvested at proper stage of maturity but with abnormal mold and spoilage.

Pasture

Excellent: A pasture furnishing an abundance of lush, actively growing, palatable forage. Such forage is generally furnished only in the flush pasture season of late spring and early summer. Good varieties of grasses and legumes, such as brome-grass or orchard-grass and ladino clover mixtures and birdsfoot trefoil, that are well fertilized. These will furnish excellent pasture for a longer period during the season. Temporary pastures of sudangrass and meadow aftermath will generally rate excellent.

Good: A pasture not as abundant and lush as excellent pasture. Varieties and fertility of soil are limiting rate of growth. Pasture is furnishing considerable grazing. A previously excellent pasture heavily grazed or during latter half of the grazing season.

Fair: A pasture making slow growth so that cows are able to keep it short, and pasture that will recover very slowly if left idle. Weedy and low-fertility hillside pastures rate as fair in the flush pasture growing season and poor the remainder of the pasture season. A growthy pasture during dry season that is tough and dry in appearance.

Poor: A pasture making very slow growth and forage that is dry and short. An over-grazed pasture; growth

is kept down to the crown by grazing animals. Weedy and low-fertility hillside pastures generally rate poor.

Price and Cost of Feed

If your State extension dairyman recommends a definite method for establishing feed prices for use in computing the cost of feed, follow that method. In some associations, a committee fixes the price to be used in computing the cost of the various feeds. If your association does not have such a committee, or if uniform feed prices for the association are not otherwise established, you and the herd owner should agree on the price of feeds to use in computing feed costs.

You may use the table shown in the appendix, p. 51, to estimate the charge for pasture.

The price of all home-grown feeds, including silage, hay, and grain, is based on the current market value on the farm in the silo, mow, or bin. The price of ground home-grown feeds includes the cost of grinding. The price of purchased feed is calculated on the basis of cost of feed in the bin.

Calculate the price of feed and also the total cost of feed to the nearest 10 cents.

Record in the proper columns and spaces on the back of the barn-book sheet, DHIA-2 (or DHIA-2A), the cost of pasture, roughage, and concentrates for the testing period, together with the total cost of all feeds.

Suggested Amounts of Grain to Feed

Month-to-month information on the recommended amount of grain each cow should receive according to her production is very valuable to the dairyman. You should not neglect to provide this information. Use the daily weights and the percentage of fat for each cow listed on the barn-book sheet to determine from the tables on form DHIA-5 the amount of grain each cow should receive. Note in the margin or in one of the blank columns of the barn-book sheet the amount of grain each cow listed should receive daily. Explain the figures to the dairyman. He should vary the recommended weights of grain to fit special cases, such as cows in poor condition that need additional feed, etc.

Estimating the Weight of a Cow

A dairyman must know how much his cows weigh if he is to feed each cow according to her maintenance and production requirements.

Use the special measuring tape which is a part of your supervisor's testing outfit to estimate the weight of a cow by her heart-girth measurement.

To take the heart-girth measurement, place the tape directly back of the cow's front legs. The cow should be standing squarely on all four legs. Draw the tape snug. Then read the estimated weight direct from the tape.

Estimate the weight of the cow the first month she is fresh, and record her weight on DHIA-2 (or DHIA-2A) and on DHIA-22 (or DHIA-22A). Estimate the weight of purchased cows the first month they are tested.

Chapter IX. Special Situations

The following paragraphs explain how to calculate production records that cannot be calculated in the usual way.

Lost Milk

If for any reason all or any part of a cow's milk is lost or poured into the storage can before you obtain its weight and sample, estimate a temporary production record for the cow by using the table on page 19. Enter the temporary production record on the barn-book sheet, DHIA-2 (or DHIA-2A), for use in obtaining monthly herd totals and averages but do not transfer it to form DHIA-22 (or DHIA-22A) in the herd-record book.

On your next monthly visit to the farm, calculate the permanent record for the cow whose milk was lost, in the usual manner for the then current period. After you enter the data for that testing period on form DHIA-22 (or DHIA-22A) in the herd-record book, calculate her production for the period in which the milk was lost by averaging her milk and butterfat production data for the testing period preceding and for the testing period following the period in which the milk was lost. When you enter the estimated record on form DHIA-22 (or DHIA-22A), write in the "Remarks" column, "Milk lost, record estimated."

Example: Suppose a cow produced 20 pounds of milk testing 4.0 percent of butterfat on the testing date in July. No milk weights or samples were obtained in August. On the September testing date, the cow produces 16 pounds of milk testing 4.2 percent of butterfat. Add and average the cow's milk weights for July and September to obtain her milk production credit for the August testing date $(20+16)\div 2$, or 18. Then multiply this figure by the number of days in the August testing period (31) to obtain her total milk production for the testing period (18×31) , or 558 pounds. Calculate her fat production as follows: $(20\times 0.04)+(16\times 0.042)\div 2$, which gives a daily butterfat production credit of 0.74 pound for the August testing period. Total butterfat production credit for the August testing period of 31 days is 0.74×31 , or 23 pounds.

Lost Samples

If the milk sample for a cow is lost or is not obtained for any reason, calculate a temporary record for the cow for the current testing period for use in calculating monthly herd totals and averages. Calculate a permanent record on the testing date the next month as outlined under "Lost milk." Make a note in the "Remarks" column of form DHIA-22 (or DHIA-22A), such as "Sample lost, record estimated."

Sick or Injured Cow

If a cow is sick or injured and you cannot obtain normal milk weights and samples on the testing date, calculate a temporary record for the cow for that testing period and calculate a permanent record on the testing date the next month, as outlined under "Lost milk." Make a note in the "Remarks" column of form DHIA-22 (or DHIA-22A), such as "Cow sick, record estimated."

Abnormal Tests

Handle abnormal high or low records, caused by sickness, severe injury, off feed, etc., similarly to lost samples. In cases of severe sickness or injury, consider as abnormal a 40-percent change in total fat from the preceding tests, except for the first month of the lactation.

The Last Month of Association Year

If for any reason you cannot obtain milk weights and samples for a cow the last month of the association year and the herd is not expected to be on test the next testing year, calculate her production record for the last month by using the data in the table on page 19.

If the herd continues on test the next year, follow the procedure outlined under "Lost milk."

Cows Nursing Calves

Any cow that is nursing calves on the testing date is considered for the time being as a dry cow, unless she qualifies as a permanent nurse cow. (See DHIA rule 24, p. 34.) Calculate her feed record as usual and record it in the herd-record book. Do not take a sample of her milk. Use the milk weight and test you obtain on the first testing date after calves are removed or the last testing date before calves were put on the cow in computing production for the testing periods in which calves were nursed.

A cow that nurses calves throughout the year is listed each month as a dry cow and is included in the monthly and yearly herd averages, unless she qualifies as a permanent nurse cow. (See DHIA rule 24, p. 34.)

Use the table on page 19 to calculate complete production records for nurse cows with one or more monthly records.

Directions for using table for estimating production of cows nursing calves—

1. Determine the number of the last testing period of the lactation before milking is discontinued or the first testing period of the lactation after milking is resumed. (The first testing period is the period in which the cow has 15 or more days in milk.)

Estimating Daily Production of Nurse Cows

Estimated 305-day production	Estimated daily production for each testing period ¹									
	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
5,000	21	21	20	19*	17	16	14	13	12*	10
5,200	22	22	21	19	18	17*	15	14*	12	11*
5,400	23	23	22	20	19	17	16*	14	13*	11
5,700	24	24	23	21	20*	19	16	15*	13	12*
5,900	25	25	24	22	20	19*	17	15	14*	12
6,200	26	26	25	23	21	19	18	16	14	13
6,400	27	27	26*	24	22	20	19*	17*	15*	13
6,600	28	28	26	25	23	21	19	17	15	14*
6,900	29	29	27	26*	24*	22*	20*	18*	16*	14
7,100	30	30	28	26	24	22	20	18	16	15*
7,400	31	31	29	27	25	23	21	19	17	15
7,600	32	32	30	28	26	24	22*	20*	18*	16*
7,800	33	33	31	29	27	25*	22	20	18	16
8,100	34	34	32	30	28	25	23	21*	19*	17*
8,300	35	35	33	31	29*	26	24*	21	19	17
8,500	36	36	34	32	29	27	24	22	20*	17
8,800	37	37	35	33	30	28*	25	23*	20	18*
9,000	38	38	36	34*	31	28	26	23	21*	18
9,200	39	39	37	34	32	29	27*	24*	21	19*
9,500	40	40	38	35	33*	30	27	24	22*	19
9,700	41	41	39	36	33	31*	28	25	22	20*
9,900	42	42	40	37	34	31	29*	26*	23*	20
10,200	43	43	41	38	35	32	29	26	23	21*
10,400	44	44	42*	39	36	33	30	27	24	21
10,700	45	45	42	40	37	34*	31*	28*	25*	22*
10,900	46	46	43	41*	38*	34	31	28	25	22
11,100	47	47	44	41	38	35	32	29*	26*	23*
11,400	48	48	45	42	39	36	33*	29	26	23
11,600	49	49	46	43	40	37*	33	30	27*	24*
11,800	50	50	47	44	41	37	34	31*	27	24
12,100	51	51	48	45	42*	38	35*	31	28*	25*
12,300	52	52	49	46	42	39	35	32*	28	25
12,500	53	53	50	47	43	40*	36	32	29	26*
12,800	54	54	51	48	44	40	37*	33	30*	26
13,000	55	55	52	49*	45	41	37	34*	30	27*
13,300	56	56	53	49	46*	42	38	34	31*	27
13,500	57	57	54	50	46	43*	39*	35	31	28*
13,700	58	58	55	51	47	43	39	36*	32*	28
14,000	59	59	56	52	48	44	40	36	32	29*
14,200	60	60	57	53	49	45	41	37	33	29
	1st	2d	3d	4th	5th	6th	7th	8th	9th	10th

¹ The numbers marked with an asterisk (*) were raised to the nearest whole number and these numbers should be used if a cow's daily production was similarly increased. For example, suppose in the sixth testing period a cow produced 24.5 to 24.9 pounds, the figure 25* would be used. If the production was between 24.0 and 24.4 pounds the figure 24 should be used.

2. Locate this number at the top of the table and follow down to the number which is nearest to the daily production of the cow.

3. The estimated daily production for each preceding or following testing period is shown on the same line. For example, a cow producing 25 pounds of milk in the third testing period would be credited with 23 pounds for the fourth testing period.

4. Use the last or first available butterfat test for computing butterfat.

5. Always indicate the number of days' production computed or estimated by using the table, by a suitable entry in the "Remarks" column on both the Lifetime Record of Individual Cow, DHIA-22 (or DHIA-22A) in the herd-record book and on the DHIA Production Report, DHIA-718. A typical entry might be: "Nursed calves 45 days (Nov. 2-Dec. 17); production estimated."

Changing the Centering Date

When new members join an association it often is necessary to change your testing route, and this may

require changing the centering date for some herds. Such a change should be made only at the beginning of a new testing year. If at all practical, you should plan your route so as to avoid the necessity of changing the centering date.

When it is necessary to change the centering date for a herd, you must make some special calculations, as the change causes either an "overlap" or a "gap" in the inclusive dates of the testing year.

To avoid the overlap or gap requires a simple adjustment in the production data for each cow in milk at the end of the testing year, on the line "Production since last fresh."

Example: Note the record of the cow Rosni, in the appendix, figures 3 and 4. The centering date for the herd is the 20th of the month. The testing year for the herd is from April 5, 1952 to April 4, 1953, inclusive. Suppose it is necessary to change the centering date in the new testing year to the 10th of the month. The inclusive dates of the new testing year would be from March 26, 1953 to March 25, 1954. The two testing years would overlap for the 10-day period March 26 (beginning of the new testing year) to April 4 (end of

the old testing year). Unless you adjust the records, Rosni would receive production credit twice for this period.

To make the adjustment for the overlap, subtract 10-days' production credit for the 12th monthly testing period of the old year from the "Production since last fresh" before you record the data in the new yearly space. Multiply the number of days by the daily milk production (of the 12th month), times the percentage of butterfat, to obtain the amount to be subtracted, as follows:

Days (number)	Milk	Butterfat
	<i>Pounds</i>	<i>Pounds</i>
189	4, 860	165
10	220	7
179	4, 640	158

Record the data (179 days, 4,640 pounds of milk and 158 pounds of butterfat) on the line "Production since last fresh." This completes the adjustment for the overlap caused by changing the centering date.

Suppose the centering date is moved forward from the 20th of the month to the 28th. There would then be a gap between the two testing years. The old testing year would end as of April 4 and the new one would start on April 13, causing an 8-day gap in the production records of individual cows. To adjust for the gap, multiply the number of days (8) by the daily milk production (of the 12th month), times the percentage of butterfat, to obtain the record to be added to the "Production since last fresh," as follows:

Days (number)	Milk	Butterfat
	<i>Pounds</i>	<i>Pounds</i>
189	4, 860	165
8	170	6
197	5, 030	171

Record the data (197 days, 5,030 pounds of milk, and 171 pounds of butterfat) on the line "Production since last fresh." This completes the adjustment for the gap caused by changing the centering date.

In adjusting for either an overlap or a gap, make a notation in the "Remarks" column in the "Production

since last fresh" line when the centering date is changed, as, for example, "Adjusted 10 days' overlap" or "Adjusted 8 days' gap."

Retesting—Owner's Request

If for any reason a herd owner is not satisfied with the test on his herd, he may call for a retest if he is willing to pay for the cost of the retest. You may stay on the farm another day to run the retest. If the owner prefers another supervisor, he should notify his county agricultural agent or his State extension dairyman, and a retest at the owner's expense may be arranged as soon as another supervisor is available. All cows tested on the first test must be included in the retest. Ordinarily the results of the first test and the retest are averaged, although either test may be discarded by the office of the State extension dairyman.

Your State extension dairyman will advise you regarding the procedure to follow in making retests.

Retesting—Automatic Retest and Surprise Test

Automatic retests and surprise tests may be ordered by the local Board of Directors of the DHIA, by the State official in charge of the Dairy Herd Improvement Association program, or by both. Automatic retest requirements and procedures established for Herd Improvement Registry (HIR) tests by the Purebred Dairy Cattle Association are followed. All costs of retests or surprise tests are paid by the owner of the cow or herd retested, at a cost that is not more than the prevailing rate schedule in use in the association.

Requirements

Automatic retests are required when, after the second test, a cow produces more fat for the 24-hour test period than shown in the following table. The age of all cows is the age at last calving.

Age	2-times daily milking	3- and 4- times daily milking
	<i>Pounds</i>	<i>Pounds</i>
Senior yearling (Jersey)-----	2. 6	2. 7
Junior 2-year-old-----	2. 7	2. 8
Senior 2-year-old-----	2. 8	2. 9
Junior 3-year-old-----	2. 9	3. 1
Senior 3-year-old-----	3. 0	3. 3
Junior 4-year-old-----	3. 1	3. 4
Senior 4-year-old-----	3. 2	3. 5
5-years old and older-----	3. 3	3. 6

Chapter X. The Herd-Record Book

Transfer Barn-Book Data to Herd-Record Book

After you have made and checked all the calculations on the barn-book sheet DHIA-2 (or DHIA-2A), transfer the individual records and the herd records for the testing period to the herd-record book.

Detailed instructions for transferring the data are given under the discussion of the various forms of the herd-record book.

Herd-Record Book

The DHIA herd-record book consists of loose-leaf forms and a special binder cover. It is designed to reduce the record work of the supervisor to the minimum and still provide the dairyman with full information about his cows and herd. The supervisor obtains the forms and binders for the members of his association through the office of the State extension dairyman. The herd-record book includes the following forms:

DHIA-1	Title page (Index—General Information)
DHIA-3	Rules Governing Testing in DHIA's
DHIA-5	Grain Feeding
DHIA-10	General Tables (Index—Herd Records)
DHIA-12	Monthly Herd Summary
DHIA-14	Ten-Year Herd Summary
DHIA-16	Register of Animals in Herd
DHIA-20	Register of Association Supervisors (Index—Cow-Records)
DHIA-21	Index and Yearly Records of Individual Cows
DHIA-22	Lifetime Record of Individual Cow
DHIA-30	Herd Improvement through Breeding (Index—Breeding)
DHIA-31	Herd Sire Record
DHIA-32	Proved-Sire Record
DHIA-33	Herd Analysis Chart
DHIA-40	Herd Analysis (Back Cover)

Form DHIA-1, Title Page (Index—General Information)

Write the name and address of the herd owner on the title page, also the name of the farm, if it has a name, and the name of the county, and the name of the association. The office of your State extension dairyman will assign each herd an identification number which will identify the herd and the association or county in which the herd is tested. Record the herd identification number in the space at the *left* of the herd owner's name.

Use the herd identification number in all reports on the herd. When both the name of the herd owner and the name of the farm appear on the title page, it is

important to indicate which name is to be used in reporting data from the herd. Check in the space provided the name to be used. This will indicate to all subsequent supervisors which name to use when reporting data from the herd. *Use the identification number and only the name so indicated in reporting all data from the herd.* Print or write the name plainly, and spell it exactly the same way in all reports.

In addition to serving as a title page for the herd-record book, with a place on the front for the name and address of the owner, information on the back of page DHIA-1 tells the herd owner what he can expect the book to contain about his herd and how he may use the information to improve his herd. There is also a list of all the forms in the book, a brief statement of the rules governing DHIA testing, a statement of the cooperation necessary between the herd owner and the supervisor to obtain records of maximum value, and a list of reports which the supervisor is required to make.

Form DHIA-3, Rules Governing Testing

This form lists the rules under which testing in Dairy Herd Improvement Associations is conducted.

Form DHIA-5, Grain Feeding

This form contains information on grain feeding for convenient reference by the herd owner and the supervisor.

Form DHIA-10, General Tables (Index—Herd Records)

This form, in addition to serving as an index page to the herd records, contains tables that frequently will be useful to the herd owner.

Form DHIA-12, Monthly Herd Summary

This form is designed to provide the herd owner with month-to-month information about his herd and with herd totals and averages at the end of the testing year. It is illustrated in the appendix, figure 5.

Fill in the headings on this form on your first visit to the farm in the association year. Record the centering date and inclusive dates of the testing year for the herd, and the herd owner's name.

Each month, transfer total and average data from the barn-book sheet, DHIA-2 (or DHIA-2A) to the Monthly Herd Summary, DHIA-12. Fill in the "Date that test was made," and inclusive dates of "Testing

period." Then transfer cow-days on test, in milk, and dry, and production data from the "Total" and "Average" lines of the barn-book sheet, DHIA-2 (or DHIA-2A) to the proper columns of form DHIA-12. Record the "herd average" data in red ink. In the appendix, figure 5, the data for the monthly testing period October 5 to November 4 are from the barn-book sheet, DHIA-2 (or DHIA-2A), shown in figures 1 and 2.

Write in the spaces provided under "Feed consumed during testing period" the kind of roughage and concentrates fed, and give the percentage of total or crude protein in the concentrates.

In order to keep the record of the herd's total production up to date, space is provided on form DHIA-12 for adding the monthly herd totals at 3-month intervals. To obtain the total for 6 months, add the total for the first 3 months to the monthly totals for the fourth, fifth, and sixth months. Just be sure you do not add the monthly totals for the first 3 months and also the 3-month total. Similarly, add the total for 6 months to the monthly totals for the seventh, eighth, and ninth months to obtain the total for 9 months. If you use the "Monthly Adjustment" lines on form DHIA-12, you will add the total for 9 months to the monthly totals for the last 3 months of the testing year to obtain the total for the year. Your State extension dairyman will advise you whether or not to use these lines.

If you use the "Monthly Adjustment" lines on form DHIA-12, you will record on the line immediately following the month being credited, all "back credits" and "forward credits" of cows that are not included in the monthly totals on the barn-book sheet, DHIA-2 (or DHIA-2A). For example, you will recall the back-credit of 7 days' production for Rosni and 11 days' production for Jane—the circled records on the barn-book sheet, DHIA-2 (and DHIA-2A), in the appendix, figures 1 and 2. These production data for the September testing period are not included in the totals on the barn-book sheet showing production for the October testing period. If you use the "Monthly Adjustment" lines, you would transfer these adjustment data for September to the line immediately following the September data, as shown in the appendix, figure 5. You would include the data in the 6 months' total and in the total for the year. (NOTE.— Figure 5 illustrates the use of form DHIA-21 with form DHIA-12, and therefore the adjustment data are not included in the totals.) You must remember that herd totals for production cannot be obtained at the end of the year by adding data on DHIA-12 unless *all* monthly adjustments are included.

If you do *not* use the "Monthly Adjustment" lines, at the end of the testing year you will transfer herd totals for production and value of product from form DHIA-21 to the "Total for year" line of form DHIA-12.

To obtain the value of product over feed cost, subtract the total cost of feed and pasture from the total value of product. This completes the calculations for the "Total for year" line of form DHIA-12. Report these totals on form DHIA-780.

To complete the "Average on a cow-year basis," divide the total cow-days on test by 365 (366 in leap year) to obtain the number of cow-years. Then divide the totals for the year by the number of cow-years, and record in the spaces provided. Transfer these herd-average data to the Ten-Year Herd Summary, DHIA-14. Then insert a new Monthly Herd Summary, DHIA-12, in the herd-record book and fill out the head-

ings for use in the new testing year. File the old summary in the back of the book or in another book along with inactive individual-cow records.

Form DHIA-22 (or DHIA-22A) Lifetime Record of Individual Cow

These forms are designed for keeping the lifetime records of a cow. (See the appendix, figs. 3 and 4.) Space is provided for recording her daily and monthly production and her feed records for a period of 4 years on DHIA-22, and 6 years on DHIA-22A. If a cow is in the milking herd more than 4 years (or 6 years), make out a second form for her in the herd-record book. Give it the same page number as the first, but with the letter "a" following the number. For example, if the first page of a cow's lifetime record is 17, the second page would be 17a.

When testing begins in a herd, fill out a form DHIA-22 (or DHIA-22A) for each cow. Endeavor to assign page numbers according to the age of the cows in the herd, with the oldest cow assigned the number 1. Never change or reassign a page number that has been assigned to a cow. Fill out a form DHIA-22 (or DHIA-22A) for each purchased cow or first-calf heifer that enters the herd while the herd is on test. Give the new cow the next consecutive page number following the page number of the last cow that entered the herd. At the end of the testing year, place the records of cows that have left the herd in the proper order (according to page number) at the back of the section "Cow Records" or, if the herd is large, in another binder.

Write so plainly that later supervisors who make out 718 cards and are unfamiliar with your writing will be able to copy the numbers correctly. After you have filled out the heading of DHIA-22 (or DHIA-22A) and have had the farmer check it for accuracy by comparing the registration certificates, color markings, and ear tag numbers, date the form and sign it in the space provided to authenticate entering the form in the herd-record book and to validate the records. Also record on the Register of Animals, DHIA-16, the page number assigned to the cow on her Lifetime Record, DHIA-22 (or DHIA-22A).

You must retain possession of all blank copies of form DHIA-22 (or DHIA-22A) until you have filled out all the headings, authenticated and validated the record, and recorded the page number of the form in the Register of Animals, DHIA-16. Do not under any circumstance place blank copies of form DHIA-22 (or DHIA-22A) in the herd-record book.

(It is suggested that you obtain a herd-record book binder for your own use, in which to keep your supply of blank forms of DHIA-22 (or DHIA-22A); also the Index, DHIA-21.)

In the heading of form DHIA-22 (or DHIA-22A), space is provided for information about the first lactation of the first-calf heifers or the lactation in progress at the time the record is set up for cows in milk. For first-calf heifers, fill in "Date bred before testing year" and "Sire used." For cows in milk, fill in also "Date fresh before testing year."

Dairymen frequently purchase fresh cows or cows in the early months of lactation. A record of the "Date fresh" is necessary in calculating and reporting their 305-day lactation records. If a purchased cow has calved not more than 30 days prior to the beginning of her first testing period in the herd, estimate her pro-

duction prior to entering the herd as outlined under Purchased Cow, page 14, so that you can obtain a complete 305-day lactation record for her first year in the herd. Note on her form DHIA-22 (or DHIA-22A) the number of days the record is estimated, as "11 days' production estimated." Make the same notation on form DHIA-718 when you report her record.

If a cow in milk is purchased from another DHIA herd on test, you can enter her "Production since fresh" in the space provided, at the top of the "Lifetime Record of Individual Cow" when you make out a DHIA-22 (or DHIA-22A) for the new owner's herd-record book. Adjust her production since fresh to the date of purchase, according to the centering date of the new owner's herd.

On the heading of the first column of DHIA-22, in the spaces "Testing period from ----- to -----," write in dates to show the beginning and end of the testing year.

Production Since Last Fresh

On the line "Production since last fresh," insert production data for cows that are in milk at the beginning of the testing year, to show production data for the portion of the lactation that was made before the current yearly record began. When the cow has been on test in the herd, obtain the data for the line "Production since last fresh" by subtracting from the cow's "Total for year" (last line on each yearly record) the "Total to date" figures after the cow went dry. Example: You would calculate "Production since last fresh" for Rosni's second lactation record, as shown in the appendix, figures 3 and 4, as follows:

	Days in milk (number)	Production	
		Milk	Fat
Total production for year.....	304	Pounds 7, 240	Pounds 243
Production to date dry, July 28.....	115	2, 380	78
Production since last fresh.....	189	4, 860	165

Record "Production since last fresh" data under the headings "Days in milk," and "Butterfat (pounds)." Enter these data in red ink. With these data at the top of the record, you can easily calculate the cow's complete lactation record later. Do not include these data in the "Total to date" of the new testing year.

Transfer Data on Barn-Book Sheet to Individual Cow Record

Transfer the data calculated and recorded on the barn-book sheet, DHIA-2 (or DHIA-2A), each month for each cow, directly to her Lifetime Record, form DHIA-22 (or DHIA-22A), in the herd-record book. Record the inclusive dates of the testing period, as reported in the heading of the barn-book sheet, in the first column. The column "Remarks" is for any other data regarding the cow or her record. Record the

estimated weight of the cow at the beginning of the testing year in the "Remarks" column.

At the end of the second month of the testing year and each month thereafter, write totals in red ink on the line "Total to date." Do not include "Production since last fresh" in these totals. Do not total the pounds of milk in the column "Daily."

At the end of the testing year, add the data for the final testing period to the preceding "Total to date" figures to obtain the "Total for year."

Transfer production data on this line to form DHIA-21 for use in compiling the total and average production for the herd as outlined on page 24.

Cows Entering the Herd During the Testing Year

When a cow enters the herd during the testing year, record production and feed data on her form DHIA-22 (or DHIA-22A) on a line similar to that used for other cows in the herd that month. Thus, her record will be completed at the bottom of the page at the end of the testing year the same as for other cows in the herd.

Calculate the production data for a lactation in progress at the end of the year and record it on the line "Production since last fresh" at the top of the space for the next year's record. If the centering date of the herd is changed, adjust the data to be transferred to "Production since last fresh" as outlined in "Changing the Centering Date," page 19. Record the ensuing year's production records in the same manner as the first year's production record. Enter a new Lifetime Record sheet, DHIA-22 (or DHIA-22A), in the herd-record book only when a cow begins her fifth (or seventh) testing year, or when a new cow enters the herd.

Lactation Production Summary

At the bottom of the form, space is provided for a lactation production summary. Record data in this space promptly as they become available. Each month, check through all the records to determine if any cow has gone dry or has completed a 305-day lactation period. Calculate the records for these cows, enter them in the proper space in the "Lactation Production Summary," and report the records on form DHIA-718 to your State extension dairyman. (See ch. XII.)

Back of Form DHIA-22 (or DHIA-22A)

On the back of the lifetime record form, in addition to the space for the yearly record of the cow, there is space for "Remarks" about the cow which are of special interest and value to the dairyman.

If you use forms DHIA-2A and DHIA-22A, fill out the box on the back of DHIA-22A at the end of the testing year. Transfer the cow's yearly record of milk, butterfat, and value of product from the "Total for year" line on the front of the form, as shown for the cow Rosni, in the appendix, figure 4.

To determine the cost of concentrates, find the average price for concentrates for the herd on form DHIA-12, by dividing the total cost of concentrates by total pounds of concentrates. (See the appendix, fig. 5: $\$1,071.30 \div 46,790 = \229 , or $\$2.29$ per cwt.)

Multiply the number of pounds of concentrates the cow received during the year by the average cost of

concentrates to obtain the cost of concentrates for the cow for the year. (See the appendix, fig. 4: $2,960 \times \$2.29 = \$6,780$, or $\$67.80$.)

Use the herd average cost of roughage. (See the appendix, fig. 5: $\$13.22$ pasture plus $\$48.53$ roughage equals $\$61.75$, which you round to the nearest 10 cents, or $\$61.80$.)

Add the cost of concentrates and cost of roughage to obtain the total cost of feed ($\$129.60$), and subtract from the value of product ($\$299.80$) to obtain the value of product over feed cost ($\$170.20$). (See the appendix, fig. 4.)

When a cow is on test part of the year only, calculate the cost of concentrates as illustrated above, but use a fractional part of the herd average cost of roughage. (See the appendix, fig. 6, for the testing year 1951-52: Average cost of roughage is $\$12.30$ pasture plus $\$51.20$ roughage, or $\$63.50$ total.) Rosni was on test $223/365$ of that year, as shown in the appendix, figure 4; the cost

of her roughage would be $\$38.80$. Complete the computation of costs as outlined above.

Form DHIA-21, Index and Yearly Records of Individual Cows

This form serves as an index of all cows on test during the year and, in addition, serves as a herd summary sheet at the end of the testing year. (See the appendix, fig. 8.)

List on the form the cows on test at the beginning of each testing year. List the cows according to the page number of their record from the lowest to the highest. (See discussion of DHIA-22 (or DHIA-22A), p. 22.)

At the end of the testing year, transfer the production data of individual cows from forms DHIA-22 (or DHIA-22A) to form DHIA-21; then add these data to obtain herd totals for the year.

Chapter XI. Identification Records

Identification of DHIA Animals

Improvement of the Nation's dairy cattle through breeding is one of the important objectives of the dairy-herd-improvement-association program. A progressive breeding program is possible, however, only when the sire and the dam of each animal in the association herds are known and recorded.

The dairy-herd-improvement-association breeding program is not confined to herds or associations within a State. Family lines of dairy cattle frequently extend to herds widely scattered in different associations or in different States. With the identification record of each association animal established and recorded in the dairyman's herd-record book so that it can be reported accurately when production records are reported (on form DHIA-718), the production records can be used to locate those individual animals (both male and female) and families of animals that possess and transmit inheritance for high-producing capacity. Such animals may then be used as breeding stock to spread the improved hereditary influence they possess throughout the general dairy-cow population.

Identification and Production Records

You must positively identify every dairy animal in a DHIA herd and record the identification on the Register of Animals, DHIA-16, in the owner's herd-record book within 60 days after the animal enters the herd by birth or purchase. Acceptable identification shall be (1) registration numbers, or (2) old or new series DHIA or ABA eartag numbers, or (3) new uniform disease eradication and control eartag numbers (State code, 3-letter prefix, 4 digits). Tattoo numbers are acceptable on purebred animals as temporary identification until the animal enters the milking herd.

Establishing Identity

A uniform plan of eartagging all unidentified animals in dairy-herd-improvement-association herds has been developed so that the identity of all animals may be recorded permanently on the Register of Animals, DHIA-16 in the dairyman's herd-record book. Identity is not established until a record of the identification is made on DHIA-16.

In most States cows in artificial-breeding associations are eartagged with special "X" series DHIA eartags. These tags, of course, provide satisfactory identification.

DHIA Eartags

A special DHIA eartag is used. The tag has a sealing device which makes removal of the tag very difficult, if it is inserted properly. One side of the tag bears the name of the State and the letters "D. H. I. A." On the other side of the tag is a number.

The State extension dairyman obtains all DHIA eartags used in his State direct from the eartag manu-

facturer. The manufacturer supplies each State with eartags, using a numbering plan in each State which is a part of the National numbering plan. This National numbering plan avoids duplication of numbers in any State or between States.

The State extension dairyman distributes the eartags to supervisors, and keeps a complete record of the serial numbers of all tags distributed to each supervisor.

The cost of this eartag is small. In most associations, the herd owner pays for the tags used in his herd.

Animals to be Eartagged

You must give all unidentified animals a DHIA eartag. All milking animals that carried a temporary identification as heifers must be registered or retagged with an acceptable identification.

Once all the animals in a herd are eartagged or registered and their identification numbers are recorded, only the young stock and purchased replacements will need to be eartagged and recorded to keep the entire herd identified.

All calves should be eartagged as soon as possible after they are born. Each time you visit a farm you should eartag all young stock and all replacements not registered or eartagged that were born or that otherwise entered the herd since your last visit.

The Supervisor Affixes the Eartags

You are responsible for all eartags allotted to you. Keep your supply in a locked box. Keep the box free from moisture and acid, to prevent rusting or corrosion of the tags. Carry only a small number of tags. This will further insure that the tag is in first-class condition when you insert it. You are responsible for eartagging all association animals, and you must account for every tag in the identification record.

Affixing an eartag is a simple process, but it should be done methodically and with great care. You should take the necessary time to affix the tag properly and securely. Special pliers are used to affix the tag. The pliers cause the prong of the tag to pierce the ear and expand within the sealing button, in one operation.

Seat the eartag properly in the jaws of the pliers so that it is held securely. The button side of the tag, bearing the name of the State and the letters DHIA, must lie flat and snug in the grooves of the jaw of the pliers. In this position the pronged side of the tag, bearing the identification number, *will not* lie flat against the other jaw of the pliers. If seated in this manner, the tag is held securely and will not move sideways in the pliers.

You must tie the animal securely so that it cannot move its head. It is not enough simply to have the animal in a stanchion. If the animal is able to move its head even slightly, the prong may be bent or the tag shifted in the pliers so that it will not seal properly.

Place the tag in the *top* of the *right* ear about one-third the distance from the head with the *numbered side of the tag on the outside of the right ear*. In this position the tag is secure and may be read easily. Avoid placing the tag in the curvature near the base of the ear, as this may result in irritation and possible loss of the tag. In a mature animal, place the tag so that the curved end of the tag will be flush with the edge of the ear. On young stock, place the tag so as to allow approximately one-fourth inch for growth of the ear. After the tag has pierced the ear, you must apply strong pressure to the handles of the pliers to insure that the tag is clinched and sealed securely. If you take these precautions, few tags will be lost.

Lost Tags

If you affix eartags properly, very few will be lost. But if an animal does lose an eartag, you should affix a new one on your next visit to the farm. When you retag an animal, you must correct its identification record in the herd-record book to keep it up to date.

Draw a line through the old eartag number on the Register of Animals, DHIA-16, in the herd-record book and on the Individual Cow-Record, DHIA-22 (or DHIA-22A), and write the new eartag number above the old number. Do not obliterate the old number, as it may be necessary to refer to the number again.

Recording Identification Records

The most important part of identifying animals with eartags is the record of that identification. Merely eartagging an animal does not identify the animal. To complete the identification, you must make a record of the eartag number together with the identification number of the sire and dam of the animal.

Record on the Register of Animals, DHIA-16, in the herd-record book the identification record of every

animal in the herd that is registered or is eartagged (including the identification numbers of the sire and dam).

Form DHIA-16, Register of Animals in the Herd

This form provides space for information that is fundamental to the entire record-keeping program. The importance of a permanent identification record of every animal in the herd cannot be overemphasized. No identification of an animal exists until a record is made of that identification on DHIA-16 (see appendix fig. 7).

Follow the instructions at the top of the form very carefully. Check this form each time you visit the farm and keep it complete, accurate, and up to date.

Routine for Filling Out Form DHIA-16

1. List all animals in the herd.
 - (a) List older animals first.
 - (b) Sources of information: Registration papers, herd books, catalogs, herd record.
2. List each calf as born.
 - (a) Eartag each calf.
 - (b) List all calves that are eartagged.
 - (c) See stable Breeding Chart and form DHIA-22 (or DHIA-22A) for sire and dam.
3. Record information on disposal when animals leave farm.
 - (a) Date sold.
 - (b) Purchaser.
 - (c) Reason for removal.
4. Make out form DHIA-22 (or DHIA-22A) for each cow in herd.
 - (a) Start when cow goes on test.
 - (b) Number pages consecutively.
 - (c) Record on DHIA-16 date animal enters herd.

Chapter XII. Lactation Records

305-Day Lactation Records

The lactation production records obtained by supervisors in dairy-herd-improvement associations are accumulated and tabulated by the Dairy Husbandry Research Branch. They are used in a nationwide program for evaluating dairy-cattle family lines in members' herds as to the inheritance the animals possess for milk-and butterfat-producing capacity. It is for this purpose you report on form DHIA-718 the production of all cows as they go dry or end the first 305 days of the lactation period.

Signaling 305-Day Lactation Records

To be sure that you report all 305-day lactation records promptly, make a notation on each cow's form DHIA-22 (or DHIA-22A) in the herd-record book at the beginning of her lactation record indicating the date (on the line for the monthly record in which the 305-day record will end) when each cow will end the first 305-days of her lactation period. (See the appendix, figs. 3 and 4.) This note will remind you when to report each 305-day lactation record. The table on the back of form DHIA-20 will be of help in determining the date the 305-day production record ends for different freshening dates.

Calculating 305-Day Lactation Records

A 305-day lactation record consists of the first 305 days of recorded production after a cow freshens. (The first 3 days' colostrum milk is not recorded.) If a cow's lactation record exceeds 305 days, report her production for only the first 305 days on form DHIA-718. If a cow does not milk for 305 days, calculate her lactation record for the exact number of days of her lactation. When you report such short-period records on form DHIA-718, write the word "Complete" in the "Remarks" column.

If a cow dies or is sold before she completes a 305-day lactation record, report her production up to the time she died or was sold, along with the actual number of days she was milked, regardless of the length of the record. If the cow is sold into another tested herd, the supervisor testing that herd will report her production record for the remainder of her lactation period.

If a cow aborts while she is dry, calculate her 305-day record the same as if she had freshened normally. If a cow in milk aborts after carrying a calf 152 days, her current record ends and a new lactation record begins.

The following example shows how to calculate 305-day records. (See the record of cow 51-WAA-4821 Rosni in the appendix, figs. 3 and 4.) Rosni had been in milk for 223 days, and had produced 7,790 pounds of milk and 265 pounds of butterfat, at the beginning of the current testing year. Her production since last

fresh is recorded on the first line of her record. Her 305-day record ends June 24, as shown in the "Remarks" column. June 24 is in the June testing period. To calculate her record to the end of the May testing period add her production since last fresh and her production in the current testing year (through the May testing period) as follows:

	Days (number)	Production	
		Milk	Butterfat
Production since last fresh.....	223	<i>Pounds</i> 7, 790	<i>Pounds</i> 265
Production in current testing year.....	61	1, 340	44
(Last total-to-date before end of 305 days) Total.....	284	9, 130	309

Then subtract 284 from 305 to find the number of days' production of the June testing period (21) to include in the 305-day record. Calculate her production for the 21 days as follows: Multiply the amount of milk she produces on the June testing date (23 pounds) by the number of days (21) to find the total amount of milk she produced in the 21 days— 23×21 , or 480 pounds. Her milk tested 3.1 percent fat, and the amount of butterfat in the 480 pounds of milk is 480×3.1 , or 15 pounds.

Then add her 21-day production to her production for the first 284 days, which completes the calculation of her 305-day lactation record as follows:

	Days (number)	Production	
		Milk	Butterfat
Production since last fresh and through May testing period of current year.....	284	<i>Pounds</i> 9, 130	<i>Pounds</i> 309
Production in June testing period (to make 305 days) ..	21	480	15
Total.....	305	9, 610	324

Many States have developed work sheets for calculating lactation records. These are very helpful as the procedure is outlined step by step. A suggested work sheet is shown in the appendix, fig. 9.

When a cow completes a 305-day lactation record, enter it in the Lactation Production Summary section at the bottom of form DHIA-22 (or DHIA-22A), as shown in the appendix, figs. 3 and 4.

Reporting 305-Day Lactation Records

Report the 305-day lactation record on form DHIA-718, Production Report, as shown in the appendix, fig. 10. Use black ink to fill out this report, as it is photographed in the Washington office to provide a permanent record of the original data.

Report the *actual* record, not the mature-equivalent record. The report (DHIA-718) includes the cow's eartag or registration number; her breed and date of birth; the eartag or registration number of both her sire and her dam; the date she calved for the lactation reported; the number of days she was dry previous to the lactation being reported; the number of days she carried a calf during the lactation being reported; the number of days she was milked 3 times a day (during the first 305 days of her lactation period); the number of days she was in milk (305 days or less); her production record for the first 305 days of her lactation period; the weight of the cow; the herd code number; and the name (use same name on all reports) and address of the owner of the cow.

Report the exact birth date on registered cows. Report the exact birth date on grade cows whenever it is possible. If the exact birth date is not known, estimate it to the nearest season and year. For information on how to estimate the age of a cow from her teeth, see the appendix, p. 52.

When an eartagged cow has been retagged, report both the old eartag number and the new eartag number. Draw a line through the old eartag number but do not obliterate it. This is to insure that all records reported for a cow under the old number will be brought together with the records reported for her under the new number, when they are permanently recorded and filed for use in proved-sire and herd-analysis tabulations. In the column headed "Remarks" write any special comments concerning the record. If a record is affected by abortion, report the approximate date of the abortion.

When you have finished filling out form DHIA-718, write the date in the Lactation Production Summary section at the bottom of form DHIA-22 (or DHIA-22A) and place your initials in the space provided to show who reported the record. Then send the DHIA-718 report to your State extension dairyman for approval of the State Agricultural College.

Back Records May Be Reported on DHIA-718

You may wish to report back records for some cows in the tested herds in order that all available records may be recorded permanently. You may report a back record for any cow whose birth date is known, provided you can establish to your complete satisfaction the identity of the cow. Otherwise, do not report a back record.

Reports (DHIA-718) Must Be Complete, Accurate, and Neat

You should read this section frequently. The seriousness of reporting incomplete or inaccurate data cannot be overemphasized. Not only are incomplete and inaccurate reports worthless, but they may actually be harmful as the incorrect data are likely to result in a sire being inaccurately evaluated.

Observe the following precautions to avoid making errors in reporting data:

Write Figures Plainly

(a) Write digits 2, 3, 5, 6, 8, 9, and 0 plainly by forming the circular parts so there is plenty of open space in the enclosed or partly enclosed space of the digits. Also, see that the circular portions of 6, 8, and 9 are completely enclosed, but that the circular portions of 2, 3, and 5 are left open. When the circular portion of a 5 is closed or nearly closed, it often resembles a 6.

(b) Leave the 4's open so they will not look like 9's, and close the 9's so they will not look like 4's.

(c) Make the digit "one" as a straight line (1) without any "tick" at the top of the line. Many times the "tick" of a 1 is large enough to look like the bar at the top of a seven (7). Similarly, make seven (7) distinct so it will not look like one (1).

(d) Write figures so plainly that anyone not familiar with your writing can read the numbers correctly.

Write Names Plainly

(a) Write or print names and addresses of herd owners so plainly that anyone not familiar with your writing can read and spell them correctly.

(b) Make all letters distinct—take care to make the first letter of names especially plain. Write capital letters like S and L, M and W, or A, C, and O so that no one will confuse one letter with another.

(c) Write small letters plainly. Letters like g, y, and z, and h and k, also m, n, r, u, and v, are easily confused unless they are written carefully. Unless the i's are dotted and e's are looped, these two letters are also easily confused. Loop the l's and cross the t's so that one letter will not be confused with the other.

(d) If your handwriting is not plain, print the names and addresses of herd owners.

(e) Include the herd identification number on all reports, and write the herd-owner's name exactly as it appears on the title page (DHIA-1) of the herd-record book.

Calculate Records Correctly

A study of errors made by supervisors in reporting 305-day lactation records revealed the following types of errors supervisors should avoid:

(a) Incorrect number of days in monthly testing period.—This error usually occurs in the first monthly testing period after a cow freshens. Many supervisors give the fresh cow credit for the total number of days in the first monthly testing period. Usually this is incorrect. Give the fresh cow production credit for only the actual number of days she is in milk during the first monthly testing period. Similarly, when a cow goes dry give her production credit for only the number of days she is in milk during the last monthly testing period of her lactation. You can avoid this error by following carefully the procedure outlined under "Fresh Cows," p. 14.

(b) Errors in addition.—Most of these errors are due to carelessness. Set the data down so the columns of digits cannot be confused. Many errors occur because the supervisor drops or adds a digit, or switches from one column to another in adding. Always check your addition. Each time you add "Totals to date," check your addition.

(c) Errors in calculation.—Errors also occur in calculating the data for “Production since last fresh.” These errors ultimately are included in the 305-day lactation record reported on DHIA-718.

Report Correct Birth Dates and Freshening Dates

Errors in reporting birth dates and freshening dates occur frequently.

Check the herd-record book carefully to be sure you have not reported one date for another, i. e., a breeding date for a freshening date, or vice versa. After you have recorded the dates on the report form, DHIA-718, check to be sure that you have not confused the various dates and that you have copied them correctly.

Report Correct Identification Numbers

In reporting identification numbers, take great care to be sure that you do not omit or transpose digits in copying numbers. Also, be sure that you are reporting the correct number, not the number of the dam or sire of the cow whose record you are reporting. In reporting DHIA, ABA, or disease control eartag numbers, report the entire number including the prefix, as 51-WAA-7814. Do not omit the “51” or the letters “WAA.”

Check each DHIA-718 report after you have it ready to mail, to be sure that the information on the report is exactly as it is recorded in the herd-record book.

To Summarize

(a) Write plainly, so figures and writing may be read correctly.

(b) Calculate records carefully and check your work.

(c) Check birth dates and freshening dates in the herd-record book, and recheck dates on reports.

(d) Copy identification numbers (registration or eartag) carefully to avoid reporting the wrong numbers or incomplete or incorrect numbers, and recheck reports with herd-record book.

Breed Designation

Use the initials of the various breeds to designate the breeds on all records and reports, as follows:

A (for Ayrshire), BS (for Brown Swiss), H (for Holstein), G (for Guernsey), J (for Jersey), and MS (for Milking Shorthorn).

Individual Animals

Designate animals (animals with registration papers) as RA, RBS, RH, etc.

Designate grade animals (without registration papers) as GR. A, GR. BS, GR. H, etc.

If the sire of a grade is registered, designate the grade as the same breed as the sire. If sire and dam are both registered but of different breeds, designate the offspring as “Mixed.”

Chapter XIII. Monthly and Yearly Reports

Monthly Reports

As the monthly reports vary somewhat in the different States, you will receive detailed instructions from your State extension dairyman as to the specific monthly reports required.

Some States use the Monthly Association Summary, (DHIA-4), to obtain a monthly summary of all herds in each association. The headings on this form are similar to those on the Monthly Herd Summary, (DHIA-12), in the herd-record book. If your State uses DHIA-4, copy the monthly data from DHIA-12 on the day you test the herd so that data for all herds will be recorded on DHIA-4 at the end of the month and the report will be ready to mail to your State extension dairyman.

Most States require the supervisor to make carbon copies of the barn-book sheet, DHIA-2 (or DHIA-2A), for each herd each month. This is an excellent procedure as it provides the State or County office with a detailed report of the work done in each association and provides data and information which may be used in State and County letters to the association members.

Some States also require narrative reports of interesting dairy practices for news articles which will be of general interest. Narrative reports should contain names and addresses, facts and figures on progress, improvement, or activities. Omit personal opinions; let the facts tell the story.

Yearly Reports

At the end of the testing year make out a yearly herd summary report, DHIA-780, for each herd, giving the yearly total production data for the herd, total value of product, total feed consumed, and total cost of feeds consumed by the herd for the testing year. Obtain the total production data and value of product from form DHIA-21, and total feed consumed and feed costs from form DHIA-12. Report the quality of roughages and pastures, as described in Chapter VIII. If the quality of roughage or pasture varies during the year, give the average quality.

Fill out form DHIA-780 completely, as shown in the appendix, fig. 11.

In associations where the testing year for all the herds tested is the same as the testing year for the association, you will fill out a DHIA-780 report for each herd as you make your rounds during the last testing period of the testing year. For herds in which cows will freshen within 10 to 13 days after the last testing date, you will have to wait until your next monthly visit to complete the yearly records if all back credits are included in the yearly totals.

In most associations, however, some herds have testing years that do not coincide with the testing year of the association. This is largely because of new herds entering the association during the testing year. In some associations, the testing year for the various herds become overlapped to such an extent that the testing year for the association must be established arbitrarily by the officers of the association.

Regardless of the testing year of the association you should fill out the yearly report (DHIA-780) for each herd as the herd completed its testing year and promptly mail the report to your State extension dairyman.

Breed of Herd (for Monthly and Yearly Herd Reports)

Registered Herd.—A registered herd is one in which 75 percent or more of the cows are registered and of the same breed, and is designated as RA, RH, etc.

Registered and Grade Herd.—If less than 75 percent but more than 25 percent of the cows in the herd are registered and of the same breed, the breed is designated as R & Gr. A, etc.

Registered Mixed Herd.—A herd in which registered cows of two or more breeds make up at least 75 percent of the herd should be designated as a "R. Mix."

Grade Herd.—A herd in which 75 percent or more of the cows are grade is designated as a grade herd, Gr. A, Gr. H, etc.

Grade Mixed Herd.—A grade herd in which two or more breeds make up at least 75 percent of the herd is designated as a "Gr. Mix."

Registered and Grade Mixed Herd.—If less than 75 percent but more than 25 percent of the cows in the herd are registered and of different breeds, the herd should be designated as a "R. and Gr. Mix."

Chapter XIV. Summary Analysis of DHIA Records

Form DHIA-14, Ten-Year Herd Summary

This form is designed to give the owner a year-to-year record of the production of his herd.

At the end of the testing year, transfer the yearly herd averages (not totals) from the Monthly Herd Summary, DHIA-12, to the Ten-Year Herd Summary, DHIA-14, as shown in the appendix, figure 6. In the lower righthand corner, space is provided for recording the progress made from year to year in increasing the number of high-producing cows and decreasing the number of low-producing cows in the herd. This record will be particularly helpful in showing the dairyman what progress he is making in improving his herd. Fill out this section according to the instructions on the form.

On the back of DHIA-14, space is provided for recording the number of cows leaving the herd during the testing year and the reasons they left the herd. You may record this information each month, or it may be more practical to record it at the end of the testing year when you transfer the Lifetime Record forms DHIA-22 (or DHIA-22A) for cows that have left the herd from the active section of the herd-record book to the back of the book or to another book.

Form DHIA-30, Herd Improvement Through Breeding (Index-Breeding)

The information on the front of this form is designed to give the herd owner a general understanding of the breeding program and to indicate how production records can be used to improve or maintain (in the case of high-producing herds) the hereditary producing capacity of the herd. On the back of the form is a discussion and an illustration of the analysis of a proved-sire record.

The Dairy Husbandry Research Branch and the State extension dairymen are making more and more use of DHIA records to help dairymen evaluate the breeding worth of cow-families, of herd sires, and of prospective herd sires.

You must understand the use of DHIA records in a breeding program. You must be able to discuss effectively the various phases of a DHIA breeding program with the dairyman. Obtain from your State extension dairyman up-to-date information on the use of DHIA records to improve the hereditary producing capacity of dairy herds.

Form DHIA-31, Herd-Sire Record

Record information about the herd sire on this form. Record new information either on the herd sire or on an animal appearing in the pedigree of the herd sire as

it becomes available, so the dairyman will have the most complete record possible about his herd sire.

In general, the greater the number of daughter-and-dam comparisons and the greater the number of lactation records included in the comparison, the more reliable is the proved-sire record. The feeding and management of the herd at the time the records were made should be studied to judge what effect environment may have had on the records of the daughters as compared with the records of their dams.

Form DHIA-33, Herd Analysis

This form provides space for diagramming the various cow-families represented in the herd. When production data have accumulated on several generations of animals in the herd, the breeding worth of the various families and of the individuals in the families can be indicated. (See DHIA-40.)

Form DHIA-40, Herd Analysis (Back Cover)

The discussion and diagram on this form illustrate the method of studying the cow-families of a herd and of indicating those cow-families from which to select brood cows.

Obtain from your State extension dairyman or your county agent full information regarding a herd analysis, so you will be sufficiently well informed to discuss it effectively with the dairyman.

Association, State, and National Summaries

The herd data reported on DHIA-780 are compiled on an association (or county), State, and National basis to show the level of production of association herds and the relationship of production to value of product, amount of feed consumed, cost of feed, and income over feed cost. The compilations are returned to the State extension dairyman for use in the dairy-herd-improvement program.

Form DHIA-32, Proved-Sire Record

As most dairymen must keep production records on their herds several years before a proved-sire record can be compiled, this form (front and back) is designed to give the dairyman some understanding of the tabulations he may receive on his herd. These will be an aid in evaluating the breeding worth of his herd sire. Copies of proved-sire records which the dairyman receives should be inserted in this section of the herd-record book.

A "proved-sire record" is the summary comparison of the production records of at least 10 unselected daughters of a sire and of the production records of their dams. A proved-sire record including from 5 to 9 daughter-and-dam comparisons is designated as a "Preliminary Proof." A proved-sire record including daughters resulting from artificial breeding only and consisting of 25 or more comparisons is designated as an "AB Proved-Sire Record." An AB proved-sire record including from 10 to 24 comparisons is designated as a "Preliminary AB Proof."

The records of the daughters and their dams are compared to indicate the milk and butterfat producing capacity transmitted by the sire. Production records used in proved-sire records are for the first 305 days of the lactation period. The records are converted to a mature-equivalent, twice-a-day milking basis. If any dam or daughter has a production record for more than one lactation the average for all her lactations is used.

Proving DHIA Sires

As soon as 305-day lactation records for at least 5 daughters of a sire and for the dams of the daughters are available, a preliminary proved-sire record is compiled for the sire by the United States Dairy Husbandry Research Branch, Washington, D. C. When sufficient additional dam-and-daughter comparisons are reported to improve the reliability of the proved-sire record, the record is retabulated. When a sire is re-proved (record retabulated) all records reported to date are included in the retabulated proved-sire record.

Four copies of each proved-sire record are sent to each State—one for the association supervisor, one for the herd owner, one for the local county agent, and one for the files in the State office.

Proved-Sire Lists

Lists of all sires proved in the country are published in a DHIA Letter, issued every month by the United

States Dairy Husbandry Research Branch. These letters are sent to State extension dairymen, county agents, and association supervisors.

Making DHIA Information Public

Local publicity is valuable to association work in the community. You should cooperate with the county agent and the local newspapers in preparing news articles. Stories that illustrate a recommended practice should be used in preference to mere statistical accounts. Remember that the real purpose of the testing work is to improve each individual herd. Stories of outstanding sires proved in the association are of interest to all dairymen in the community. Herds in which unusual improvement has been made through association work are also good material for news stories.

Stories featuring merely the high-record cows and the high-record herds frequently fail to benefit the work of the association, as such publicity may encourage "race horse" practices among members.

If monthly herd averages are published, it should be borne in mind that, although monthly herd averages may be worked out satisfactorily for each herd with a fair degree of accuracy, the data are not absolutely comparable between herds as the herds have different centering dates and their records are for different periods.

In publishing herd averages it is sometimes advisable to list institutional herds separately. Often individual dairymen dislike to have their herds compared with herds owned by institutions. Also owners of large herds dislike to have their herds compared with smaller herds, since it is often more difficult to make a good average with a large herd than a small one.

In listing monthly and yearly herd averages, it may be advisable to classify the herds as small herds (less than 15 cows), medium herds (15 to 30 cows), and large herds (more than 30 cows), or some similar classification suitable for the herds being tested.

Chapter XV. DHIA Rules

(Revised and Approved by the American Dairy Science Association in June 1955)

1. Standard Testing Equipment

Testing equipment shall conform to the standard set by the American Dairy Science Association.

2. Identification, Feed, and Production Data

Owners must make available all registration certificates and other information for proper identification of animals on test and their offspring. They must cooperate and assist the supervisor in obtaining feed weight, roughage quality, freshening and dry dates, purchase and sale dates, and any other information needed for calculating complete DHIA records.

3. Identification of Animals

Every dairy animal in DHIA herds must be positively identified and recorded on registry page DHIA-16 of the owner's herd-record book within 60 days after entering the herd by birth or purchase. Acceptable identification shall be (1) registration numbers, or (2) old or new series DHIA or ABA eartag numbers, or (3) new uniform disease eradication and control eartag numbers (State code, 3-letter prefix, 4 digits). Tattoo numbers are acceptable on purebred animals as temporary identification until the animal enters the milking herd.

4. Lactation Record Reports

DHIA Lactation Record report, DHIA-718, shall be completed and filed for every cow on test for each lactation regardless of whether or not the record is completed. Each lactation record shall be recorded on the respective individual cow record page DHIA-22 (or DHIA-22A), in the lactation production summary.

5. Monthly and Yearly Reports

The supervisor shall make monthly and yearly reports as required by the State agricultural college. Yearly feed and production records for each herd shall be reported at the close of the testing year for each herd on form DHIA-780.

6. Cows To Be Tested

Records shall be kept on all dairy cows that are in the herd on the day the supervisor visits the farm. Every cow that has ever freshened must be included regardless of stage of lactation or ownership. Herds (for listing or publicity purposes) shall consist of five or more cows located on one or more farm units under one management. In case there is more than one farm unit, a composite average for all units of the herd shall be computed and published as the herd average. Herds not including all cows shall not be considered standard or regular DHIA herds and all monthly and yearly publicity shall be withheld.

7. Monthly and Bimonthly Testing

Associations may operate on the monthly or bimonthly basis, or on both.

8. Number of Cows Tested Daily

The supervisor shall take sufficient time at each milking to comply properly with the following rules: Identification of all animals in the DHIA herd including eartagging, cows to be tested, supervision of milking, identification of cows being

milked, supervisors use own data, lock sample cases, and method of sampling. In addition sufficient time shall be allotted to each herd to complete the herd-record book, check it for accuracy, and make all required monthly, yearly, and lactation reports. The average number of cows tested per day during the month shall not exceed 35 unless special approval is given by the Board of Directors.

9. Doubling Herds

It is recommended that as a general rule only 1 herd be tested in 1 day.

10. Supervision of Milking

The location of the cows being milked should be such that the supervisor can effectively observe the milking at all times.

11. Identification of Cows Being Milked

The supervisor shall verify the identity of each cow when entered on test by comparing color markings, eartags, and registration certificates, and by recording the information on the individual cow record, form DHIA-22 (or DHIA-22A). Thereafter, at each milking the supervisor must assure himself of the correct identity of each cow as she is milked.

12. Supervisor Uses Own Data

The supervisor, or a person authorized and approved by the State extension dairyman and the responsible organization, shall compute the production records for a testing period from the data obtained on the testing date by the supervisor.

13. Centering the Testing Day

Production records shall be calculated by centering the testing day according to the method outlined in the DHIA Supervisor's Manual.

14. Supervisor's Route

In order that the herd owner may not know the exact day the supervisor will visit a farm the supervisor shall from time to time vary his visits to each farm as much as 3 days ahead of, or 3 days after, the regular testing day. (Regardless of such variation, however, all calculations should be made on the basis of the regular centering day established for the herd.)

15. Lock Sample Cases

All milk samples and glassware and unrecorded barn-book pages shall be kept under lock and key when not under the immediate observation of the supervisor.

16. Method of Sampling

All weighing, sampling, and recording of each milking of each cow for the 24-hour period shall be done by the supervisor. Each cow's milk must be thoroughly mixed immediately before sampling.

17. Lost Samples

If for any reason the sample is spilled or lost and another sample cannot be obtained, the records shall be held open until the following month when the average of the production for the preceding and for the following testing periods should be taken as the production for the current testing period. NOTE.—If records are being calculated by mechanical methods (punchcards or tape), the following rule shall apply: When a sample is lost, the previous month's butterfat test shall be used. When milk weights are not obtained, the pounds of milk for the current testing day shall be estimated from the previous month's record by use of the nurse-cow table on page 19. In either case, the record shall be marked "estimated."

18. Butterfat Test

The Babcock test is to be used in all dairy herd improvement associations. In applying the Babcock test the official rules adopted by the American Dairy Science Association shall be followed.

19. Abnormal Tests

In cases of severe sickness or injury, it is suggested that, except for the first month of the lactation, a 40-percent change in total fat from the preceding tests shall be considered abnormal.

Abnormal high or low records due to causes such as sickness, severe injury, off feed, etc., shall be handled similarly to lost samples.

20. Retests—Owners Request

If for any reason a herd owner is not satisfied with the test on his herd, he may call for a retest if he is willing to pay for the cost of the retest.

Automatic Retests and Surprise Tests

Automatic retests and surprise tests may be ordered by the local association board and/or the State official in charge of the Dairy Herd Improvement Association program. Automatic retest and surprise test requirements and procedures established for Herd Improvement Registry (HIR) tests by the Purebred Dairy Cattle Association shall be followed. All costs of the retest or surprise test must be paid by the owner of the cow or herd tested. The cost is to be not more than the prevailing rate schedule in use in the Association.

21. Fresh Cows—Dry Cows

A cow should not be tested until the 7th day after she calves, counting the day of calving as the first day. The first milk weight and sample can be taken on the evening of the 6th day. The record, however, is started on the 4th day after calving, counting the calving day as the first day. Cows freshening after the supervisor's regular visit and before the end of the testing period should be given credit for their production during that period, as calculated on the basis of the results of the next test. Dry cows—the dry date is the first day the cow is not milked.

22. Cows With Mastitis

Cows with garget (mastitis) in one or more quarters shall receive credit for the production from the good quarters only.

23. Aborting Cows or Cows Freshening Without Going Dry

In case a cow aborts while dry, her record shall be figured the same as for a fresh cow. If she aborts while in milk and has carried a calf less than 152 days, her current record shall continue without interruption.

24. Cows Nursing Calves

Temporary Nurse Cows

Cows nursing calves on the testing day are considered for the time being as dry cows. Feed records are taken as usual and

recorded in the herd-record book. No milk samples are taken. Milk weights and tests obtained on the first testing day after calves have been removed or the last testing day before calves are put on cows are used in computing production for the testing periods in which calves were nursed, using nurse-cow table, page 19.

Permanent Nurse Cow

At the request of the herd owner, a cow that is to be used as a nurse cow throughout the entire lactation period may be removed from test from the date of freshening until the following date of freshening, provided she has at least one complete lactation record.

25. Obtaining Production, Feed, and Identification Data

Herd owners must make available all registration certificates and other information needed for proper identification of animals on test and their offspring. They must cooperate with the supervisor in obtaining feed weights, roughage quality, freshening and dry dates, purchase and sale dates, and any other information needed for calculating complete DHIA records.

26. Yearly Herd Averages

The yearly herd average is calculated on a cow-year basis. As outlined in the footnotes on the Monthly Herd Summary, DHIA-12, the total number of cow-days on test for the year is divided by 365 (366 in leap year) to obtain the number of cow-years. The totals for the year are divided by the number of cow-years to obtain the herd averages for the year.

Fresh cows that cannot be tested on the supervisor's last visit of the year or cows freshening after the supervisor's last visit but before the end of the year will not receive credit for production for the last testing period unless the owner continues to test the following year. In this case the records are completed the first test of the following year.

27. Yearly Association Average

The association average is found by dividing the total pounds of milk and total pounds of butterfat by the total cow-years.

28. Computing Fractions

The weights of milk at each milking and the day's total of milk are recorded to the nearest one-tenth of a pound, the month's milk to the nearest ten pounds. The price per hundred-weight of milk and feed may be taken to the nearest ten cents, likewise the value of product and cost of feed may be to the nearest ten cents. If the fraction is less than half, drop it. If half or more, change to the next highest number.

29. Fraudulent Practices

Any practice that is intended to create or does create an abnormal percentage of butterfat or an abnormal yield of milk is a violation of DHIA rules.

30. Relation of Supervisors and Owners

As an employee of the local dairy-herd-improvement association, the supervisor's duty is to see that the tests are honestly made, accurately recorded, and completely reported. No gratuitous payment to the supervisor is permitted from the member, or others with a financial interest in the herd. The supervisor shall not test his own herd or the herd of the immediate members of his family. The supervisor is not at liberty to decide which rules are essential and which are not, but is required to observe them in all details. Owners or persons in their employ are held equally responsible with the supervisor for the enforcement of these rules.

Appendix

BARN BOOK DHIA-2
(OLD FORM)

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
CATTLE RESEARCH DIVISION

Association Greene County Test period from Oct. 5, 1952 to Nov. 4, 1952 Days on pasture 31 Days in milking 31

Date Oct. 20, 1952 date Oct. 20, 1952 Owner John Smith Address Shoreville, Ark.

Centering Oct. 20, 1952 from Oct. 5, 1952 to Nov. 4, 1952

No.	Cow's name and date of registration	Time of milking		Milk (Pounds)	Butterfat (%)	Value of milk		Value of milk		Total	Days on pasture	Days in milking	Total	Days on pasture	Days in milking	Total	
		AM	PM			Price	Butterfat	Price	Butterfat								
1	51-WA-4125	31	31	15.8	4.00	24.12	27.10	10	10	10.20	16.90	31	31	31	31	31	31
2	51-WA-4121	31	31	14.5	4.00	24.12	27.10	10	10	10.20	16.90	31	31	31	31	31	31
3	51-WA-4117	31	31	14.5	4.00	24.12	27.10	10	10	10.20	16.90	31	31	31	31	31	31
4	1209-330	31	31	14.5	4.00	24.12	27.10	10	10	10.20	16.90	31	31	31	31	31	31
5	51-WA-4116	31	31	14.5	4.00	24.12	27.10	10	10	10.20	16.90	31	31	31	31	31	31
6	51-WA-4150	31	31	14.5	4.00	24.12	27.10	10	10	10.20	16.90	31	31	31	31	31	31
7	51-WA-4151	31	31	14.5	4.00	24.12	27.10	10	10	10.20	16.90	31	31	31	31	31	31
8	1402-567	31	31	14.5	4.00	24.12	27.10	10	10	10.20	16.90	31	31	31	31	31	31
9	51-WA-4153	31	31	14.5	4.00	24.12	27.10	10	10	10.20	16.90	31	31	31	31	31	31
10	51-WA-4126	31	31	14.5	4.00	24.12	27.10	10	10	10.20	16.90	31	31	31	31	31	31
11	1043-3987	31	31	14.5	4.00	24.12	27.10	10	10	10.20	16.90	31	31	31	31	31	31
12	51-WA-4124	31	31	14.5	4.00	24.12	27.10	10	10	10.20	16.90	31	31	31	31	31	31
13	51-WA-4152	31	31	14.5	4.00	24.12	27.10	10	10	10.20	16.90	31	31	31	31	31	31
14	51-WA-4121	31	31	14.5	4.00	24.12	27.10	10	10	10.20	16.90	31	31	31	31	31	31
15	51-WA-4128	31	31	14.5	4.00	24.12	27.10	10	10	10.20	16.90	31	31	31	31	31	31
Total		403	403	58	7200	292	330.00	312	312	312.00	174.0	31	31	31	31	31	31
Average		13.0	13.0	1.85	554	28.5	25.30	10.0	10.0	10.00	5.20	31	31	31	31	31	31

(The average in the first column (concentrations) is obtained by dividing the total days on test by the number of days in the milking period. To obtain the other averages, divide each total by the number of days on test.)

[OVER]

FEED PRICES

Feed	Quantity	Price per ton	CONCENTRATES		Cost
			Percentage	Pounds	
Alfalfa (100 lbs. dry)	100	18.40	100	7.3	2.50
(100 x 31 days)	3100	7.00	200	12.0	2.00
Wheat hay (3600 lbs.)	3600	18.00	100	12.7	1.50
(100 x 31 days)	1000	18.00	100	16.1	2.50
Total	6000	60.00	100	35.4	3.00

Pounds of protein 600 = Percentage protein in grain mixture
Pounds of concentrates 95.5

Cost 2.25 per cwt.
Whole milk 2.25 per cwt.
Skim milk (price credited) 1.13 per cwt.

PRICE RECEIVED FOR PRODUCT: Butterfat _____ per pound. Whole milk _____ per cwt.
Bottled milk _____ per gallon. Other _____ per cwt.

Suggested ration: no change
600/13.50
4.64 on cost of hay
130/60.30
600/95.5 (15.9% protein)

Cost _____ per cwt.
Improvements suggested: none
Hard and dairy improvements noted: Individual animals being fed more nearly according to production.
Separate lot _____ percent.
Pounds of butterfat lost _____
Value of butterfat lost \$ _____

[OVER]

Figure 1.—Barn book, DHIA-2: Left, Front of page; right, back of page.

Barn name Rosini

CALVING RECORD

Date of Culling	Name and Registered No. of Site	Sex of Calf	Calf's Name and Earring No.	Page in Herd Book	Disposition etc.
8-23-57	5-28841	M	57-WAA-3685		weaned
9-25-52	528841	H	Bog 57-WAA-4968		

U. S. GOVERNMENT PRINTING OFFICE: 1955 O-339143 16-47900-2

FIGURE 3 — Lifetime record of individual cow, DHIA-22: *Upper*, Front of page; *lower*, back of page.

Registration name

LIFETIME RECORD OF INDIVIDUAL COW

U. S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

Registration name

Breed *Equus 2.*

Date of birth

Date of birth: Nov. 26

19 49 Sire *Roosje Kematted Netherlands Legis*

Registration No.

Barn name

Barn name *Posni*

SEARCH BRANCH 51-WAA-4

Check if cow is progeny.

Check if cow is progeny.

Signature of Supervisor

James Bow-

✓

Don
B...

0

Fartag or 51-WAA-47/

Page No. 10

Testing year	<u>April 5 1951</u>	to April 4, 1952	Testing year	<u>April 5, 1952</u>	to April 4, 1953	Testing year	<u>April 5, 1953</u>	to April 4, 1954
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Testing year April 5, 1953 to April 4, 1954

Testing year April 5, 1952 to April 4, 1953

Testing year April 5, 1951 to April 4, 1952

[illegible]

CALVING RECORD

The supervisor shall report all 305-day lactation records to State Agricultural College on Form DHA-718																	
Name and registered No. of sire	Sex of calf	Calf's name and estab. No.	Calf's page in herd in book	Disposal of calf	Date of calving	Official type classification	Cow's weight at calving	Age, year/month	Total production				305-day lactation record			Superior's final record is reported	
									Days in milk	Days milked a month	Milk (lb.)	Test (%)	B fat (lb.)	Milk (lb.)	B fat (lb.)		Date reported on J.R.
528841	M	51-WAN-3685		weaned	1-23-51		1150	2-7	338	10170	343	9610	324	6-20-52	J.R.		
528841	H	Reg 51-WAN-4968			9-25-52		1280	3-8									

LACTATION PRODUCTION SUMMARY

LACTATION PRODUCTION SUMMARY

The Supervisor shall report all 305-day lactation records to State Agricultural College on Form DHIA-718

Barn name

REMARKS (Disposal, etc.):U. S. GOVERNMENT PRINTING OFFICE : 1954--O-318052

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MONTHLY HERD SUMMARY

DHIA-12
(10-54)

Centering date 20th Record from April 5, 1953 to April 4, 1953 Herd of Jim Smith (51-12-0437)

Date that test was made	Testing period	TOTAL COW-DAYS		PRODUCTION		HERD AVERAGE		FEEDS CONSUMED DURING TESTING PERIOD		Cow-days on pasture	COST OF FEED			Value above or below cost of feed (Circle negative)
		On test	In milk	Dry	Milk (pounds)	Test %	Butterfat (pounds)	Total value of product	Milk (pounds)	Butterfat (pounds)	Roughage (pounds)	Concentrates (pounds)	Pasture	
								\$	\$	\$	\$	\$	\$	\$
Apr. 20, 1952	15 w/4	480	480	0	14600	4.3	635	104 659 90	12000	2400	4540			240 24 00
Monthly adjustment	(16.0)													
May 19	15 w/4	496	403	93	14120	4.2	590	110 648 10	3200		3890			496 49 50
Monthly adjustment	(16.0)													
June 21	15 w/4	450	450	0	12560	4.0	500	113 566 50	3000		3530			450 45 00
Monthly adjustment	(15.0)													
3 mo. total		1426	1333	93	41280		1725	1874 50	15200	5400	11960			1186 118 50
Monthly adjustment	(15.0)													
July 18	15 w/4	465	434	31	11620	4.0	467	111 520 60	4500		3700			465 46 00
Monthly adjustment	(14.8)													
Aug. 21	15 w/4	460	429	31	11180	4.0	447	113 503 10	4620		3660			465 45 20
Monthly adjustment	(14.8)													
Sept. 20	15 w/4	480	420	60	10360	4.2	437	109 476 60	4800		3480			480 24 00
Monthly adjustment	(16.0)													
6 mo. total		2831	2616	215	74440		3076	3374 80	15200	19320	22800			2596 213 70
Monthly adjustment	(13.0)													
Oct. 20	15 w/4	403	345	58	7200	4.1	292	113 330 00	5270	4650	3230			60 30
Monthly adjustment	(16.0)													
Nov. 19	15 w/4	540	450	90	9230	4.2	300	125 550	8100	8100	3930			101 20
Monthly adjustment	(18.0)													
Dec. 20	15 w/4	552	399	153	1010			172 00	8100	8100	4290			101 20
Monthly adjustment	(17.8)													
9 mo. total		1617	1366	484	8352	4.2	349	382 00	4503	3625	2493			161 13 23
Monthly adjustment	(19.0)													
Jan. 22, 1953	15 w/4	590	519	782	135050		5677	1096 80 00	72820	54620	46790			2596 213 70
Monthly adjustment	(19.0)													
Feb. 20	15 w/4	527	403	124	11960	4.2	501	111 554 70	12750	5100	4370			90 50
Monthly adjustment	(16.0)													
Mar. 21	15 w/4	527	403	124	11960	4.2	501	111 554 70	12750	5100	4370			90 50
Monthly adjustment	(17.0)													
Total for year!		5901	5119	782	135050		5677	1096 80 00	72820	54620	46790			2596 213 70
Average cow-year basis!		1617	1366	484	8352	4.2	349	382 00	4503	3625	2493			161 13 23

* Data on "Total for year" line are reported on Form DHIA-780.
* Data on this line are transferred to Ten Year Herd Summary sheet, DHIA-14.

Yearly summary reported Mar. 21, 1953
(Date)

Yearly totals obtained from DHIA-21

* Total cow-days on test is divided by 365 to obtain number of cow-years. Data on line "Total for year" are divided by number of cow-years to obtain herd average on cow-year basis.

Obtained by subtracting total feed cost \$2098.47 from value of product \$6180.00

James E. Shaw
(Supervisor's signature)

Rations Used—Feed and Milk Marketing Data for Testing Year From April 5 1952 to April 4 1953

GRAIN RATIONS FED EACH MONTH DURING YEAR										ROUGHAGES		PASTURES		CONCENTRATES					PRICES RECEIVED FOR PRODUCT		
MONTH	Total Percent Protein	Cost of 100 Lbs. of Ration	KINDS OF CONCENTRATES IN RATION					KINDS OF ROUGHAGES		KIND	Qual.	-Cost per Mo	NAME OF CONCENTRATES USED					MARKETED AS—			
			Barley	Oats	Indian Meal	Sorghum	Wheat	37.2	Silage				Mixed Hay	Price per Ton	Price per Unit	Whole Milk	Cream				
April	15.9	2.30	100	200	100	100	100	7-	8-	Blower and Muck spreader	8-	3-	50-	45-	28-	48-	60-	4.47	(4.3)		
May	15.9	2.30	100	200	100	100	100	7-	8-			3-	50-	45-	28-	48-	60-	4.62	(4.2)		
June	15.9	2.30	100	200	100	100	100		8-			3-	50-	45-	28-	48-	60-	4.52	(4.0)		
July	15.9	2.23	100	200	100	100	100		8-			3-	50-	40-	28-	50-	60-	4.44	(4.0)		
August	15.9	2.22	100	200	100	100	100		18-	F	F	1.50	50-	40-	28-	48-	60-	4.52	(4.0)		
September	15.9	2.23	100	200	100	100	100		8-		1.50	1.50	50-	40-	28-	50-	60-	4.58	(4.2)		
October	15.9	2.25	100	200	100	100	100	8-	8-				50-	40-	30-	50-	60-	4.63	(4.1)		
November	17.4	2.29	100	200	100	100	100	7-	8-				50-	40-	30-	50-	65-	4.66	(4.2)		
December	17.4	2.28	100	200	100	100	100	7-	8-				50-	40-	30-	48-	65-	4.51	(4.1)		
January	17.4	2.29	100	200	100	100	100	7-	8-				50-	40-	32-	48-	65-	4.58	(4.2)		
February	17.4	2.38	100	200	100	100	100	8-	18-				50-	45-	32-	48-	65-	4.79	(4.7)		
March	17.4	2.38	100	200	100	100	100	7-	18-				50-	45-	32-	48-	65-	4.66	(4.4)		

NOTE TO SUPERVISOR—This page will provide valuable information for evaluating records. Roughages, such as hays and silage should be graded by the fieldman for quality. Use E for excellent, G for good, F for fair, and P for poor. Place the letters above the price per ton in the proper square for each month. Do the same for pastures.

FIGURE 5.—Monthly herd summary, DHIA-12: Upper, Front of page; lower, back of page.

TEN-YEAR HERD SUMMARY

(YEARLY HERD AVERAGES—COW-YEAR BASIS)

Herd of _____

37) Jim Smith

Testing year (Give inclusive dates)	Total cow-years on test	Cow-days dry	PRODUCTION			Unit price Milk Fat	Total value of product	FEEDS CONSUMED DURING YEARLY TESTING PERIOD					Cow-days pasturing	COST OF FEED							Value above or below cost of feed (Circle negative)
			Milk (pounds)	Test %	Fat (pounds)			Roughage (pounds)		Concentrates (pounds)	Pasture	Barn or rack-fed roughage		Concentrates	Total cost of feed and pasture						
								Silage	Hay							None	Milk				
51-52	1745	651	8275	4.2	348	1.20	41800	4705	3905	2945	None	1704	1230	5120	6730	13080	28740				
52-53	1617	782	8352	4.2	349	1.09	38200	4503	3625	2893			1322	4853	6625	12800	25419				

TEN YEAR PROGRESS IN IMPROVING YOUR HERD

The table below, when properly filled out each year, will enable you to see the year-by-year progress you are making in improving your herd. As you continue testing, the proportion of cows in the high-production brackets should increase and the proportion of cows in the low brackets should decrease or disappear.

The rectangle of the production group in which the association average falls is boxed in each year so you can see at a glance how many cows you have *above*, *at*, or *below* the average cow of the association.

Butterfat production per cow:	Number of cows producing different amounts of butterfat each year —									
	1952	1953	19__	19__	19__	19__	19__	19__	19__	19__
425 pounds or more.....		/								
400 to 424 pounds.....	/	/								
375 to 399 pounds.....	/	/								
350 to 374 pounds.....	<u>11</u>	<u>12</u>								
325 to 349 pounds.....	3	2								
300 to 324 pounds.....	2	3								
275 to 299 pounds.....	2									
Under 275 pounds.....	/	/								
ASSOCIATION AVERAGE	357	362								

TO THE SUPERVISOR:

At the end of the association year, record the number of cows in the herd in each production group. Include all cows on test 12 months.

Obtain these data by checking the yearly production of each cow on Form BDI-DHLA-22, Lifetime Record of Individual Cow. Count the number of cows in each production group. Use actual production of butterfat as recorded. Do not compute to a 2-time-milking mature-equivalent basis.

When the average production of butterfat per cow for the *Association* is obtained, record the average on the bottom line of the table at the right. Also run a heavy line around the rectangle of the production group in which the association average falls.

NUMBER OF COWS LEAVING THE HERD Each Year—by Age

REASONS for leaving herd	1951-52										1952-53										19									
	Age (in years)					Age (in years)					Age (in years)					Age (in years)					Age (in years)					Age (in years)				
	2	3	4	5	6	7	8	9	10	11	2	3	4	5	6	7	8	9	10	11	2	3	4	5	6	7	8	9	10	11
HEALTH:																														
Mastitis																														
Bangs																														
Udder trouble																														
Sterility																														
Tuberculosis																														
Other																														
Subtotal																														
Low production																														
Old age																														
Died																														
Accident																														
Sold for dairy purposes																														
Other reasons																														
Total																														
Leaving for health reasons %																														

REASONS for leaving herd	19										19										19									
	Age (in years)					Age (in years)					Age (in years)					Age (in years)					Age (in years)					Age (in years)				
	2	3	4	5	6	7	8	9	10	11	2	3	4	5	6	7	8	9	10	11	2	3	4	5	6	7	8	9	10	11
HEALTH:																														
Mastitis																														
Bangs																														
Udder trouble																														
Sterility																														
Tuberculosis																														
Other																														
Subtotal																														
Low production																														
Old age																														
Died																														
Accident																														
Sold for dairy purposes																														
Other reasons																														
Total																														
Leaving for health reasons %																														

Figure 6.—Ten-year herd summary, DHIA-14: Upper, Front of page; lower, back of page.

REGISTER OF ANIMALS IN HERD OF (51-12-0437) Jim Smith

Register Page No. 1

This register constitutes a permanent list of animals in the herd. All entries must be made in ink. No erasures or "write over" corrections whatever shall be made on the register. A line shall be drawn through incorrect entries and the correct entry made on another line. Erasures may reflect on the validity of all the data in the entire record book. The supervisor shall list on this register every animal in the herd. Purchased stock shall be listed on this register as they enter the herd. Each calf born in the herd that is ear-tagged shall be listed. Each entry must be complete, including data on the sire and dam of the animal listed. As each cow is placed on test the supervisor shall make out and enter in the herd record book an individual cow record (DHA-22). The page number on form DHA-22 assigned to the cow becomes the permanent page number of the cow and it shall not be changed or reassigned. The supervisor places his initials in the proper column opposite each listing below to authenticate the entry. When more than one register page is required, each page shall be numbered and these numbers shall not be changed or reassigned.

Name	Ear-tag or Registration No.	Page No.	Date of Birth	Bred	Sex	SIRE		DAM		Date animal enters herd and initials of supervisor registering animal	Date weaned	Disposal (Include date)
						Name	Ear-tag or Registration No.	Name	Ear-tag or Registration No.			
<i>Legis Hemstead</i>	E.T.					<i>Sible Hemstead</i>				Date 1-20-51 Initials	9/1/50	<i>Sold - Henderson</i>
<i>Booni</i>	Reg. 1114680	1	2-15-45	R.H.	F	<i>Booni Legis</i>	976542	<i>Legis Hemstead</i>	1032791	Initials	1/5	10-3-52
	E.T. 51-WM-4768					<i>Sible Hemstead</i>			<i>unknown</i>	Date 1-20-51 Initials	9/1/50	
<i>Boonie</i>	Reg.	2	3-18-45	H.	F	<i>Booni Legis</i>	976542			Initials	1/5	<i>Died 9-1-52</i>
	E.T. 51-WM-4812					<i>Sible Hemstead</i>			<i>unknown</i>	Date 1-20-51 Initials	3/1/47	<i>Sold - low production</i>
<i>Sue</i>	Reg.	3	8-28-46	H.	F	<i>Booni Legis</i>	976542			Date 1-20-51 Initials	3/1/47	7-6-52
	E.T. 51-WM-4837					<i>Sible Hemstead</i>			<i>unknown</i>	Initials	1/48	<i>Sold - low production</i>
<i>Mae</i>	Reg.	4	8-11-47	H.	F	<i>Booni Legis</i>	976542			Date 1-20-51 Initials	3/1/48	7-6-52
	E.T. 51-WM-4825					<i>Sible Hemstead</i>			<i>unknown</i>	Initials	1/48	
<i>Dot</i>	Reg.	5	9-10-47	H.	F	<i>Booni Legis</i>	976542			Date 1-20-51 Initials	3/1/48	
	E.T. 51-WM-4821					<i>Booni Hemstead</i>				Date 9-20-51 Initials	9/1/49	
<i>Booni</i>	Reg.	6	1-26-49	H.	F	<i>Netherland Legis</i>	989435	<i>Boonie</i>		Date 9-20-51 Initials	9/1/49	
	E.T. 51-WM-4817					<i>Booni Hemstead</i>				Date 9-20-51 Initials	9/1/49	
<i>Lucile</i>	Reg.	7	2-3-49	H.	F	<i>Netherland Legis</i>	989435	<i>Sue</i>		Date 9-20-51 Initials	9/1/49	
<i>Sible Legis</i>	Reg.	8	2-10-49	R.H.	F	<i>Booni Hemstead</i>	989435	<i>Legis Hemstead Booni</i>	1114680	Date 9-20-51 Initials	9/1/49	
<i>Hemstead Royal</i>	E.T. 51-WM-4836					<i>Netherland Legis</i>		<i>Mae</i>		Date 9-20-51 Initials	9/1/49	
	Reg.	9	3-21-49	H.	F	<i>Booni Hemstead</i>	989435			Date 9-20-51 Initials	9/1/49	
<i>Stubby</i>	Reg.	10	6-16-49	H.	F	<i>Netherland Legis</i>	989435	<i>Dot</i>		Date 1-19-51 Initials	6/1/50	
<i>Betty</i>	E.T. 51-WM-4850					<i>Booni Hemstead</i>				Date 1-19-51 Initials	6/1/50	
	Reg.	11	11-18-49	H.	F	<i>Netherland Legis</i>	989435			Date 1-19-51 Initials	6/1/50	
<i>Sairst</i>	Reg.	12	3-9-50	R.H.	F	<i>Booni Hemstead</i>	989435	<i>Legis Hemstead Booni</i>	1114680	Date 1-19-51 Initials	6/1/50	
<i>Royal Legis</i>	E.T. 51-WM-4838					<i>Netherland Legis</i>		<i>Sue</i>		Date 1-19-51 Initials	6/1/50	
<i>Sible Hemstead</i>	Reg.	13	3-10-50	H.	F	<i>Legis Netherland</i>	954652			Date 1-22-52 Initials	9/22/50	
	E.T. 51-WM-4826					<i>Hemstead</i>		<i>Mae</i>		Date 1-22-52 Initials	9/22/50	
<i>Sol</i>	Reg.	14	3-16-50	H.	F	<i>Legis Netherland</i>	954652			Date 1-22-52 Initials	9/22/50	
	E.T. 51-WM-4826					<i>Legis Netherland</i>		<i>Legis Hemstead P.H.</i>	1139684	Date 1-22-52 Initials	9/22/50	
<i>Margu</i>	Reg.	15	3-18-50	R.H.	F	<i>Hemstead</i>				Date 1-22-52 Initials	9/22/50	
<i>Hemstead Legis</i>	E.T.											
<i>Royal Sible</i>	Reg. 2043987											

REGISTER OF ANIMALS IN HERD OF (51-12-0437) *Joan Smith*

Name	Eartag or Registration No.	Page No.	Date of Birth	Sex	Sire		Dam		Date animal enters herd and initials of animal	Date animal was last examined	Disposal (Include date)
					Name	Eartag or Registration No.	Name	Eartag or Registration No.			
<i>Babe</i>	E. T. 51-WMA-4824 Reg.	16	5-27-50	Gn. F	<i>Legis Netherlands</i>	954652	<i>Dot</i>	51-WMA-4824	6-21-52 Initials	7/1/50	
<i>Ruth</i>	E. T. 51-WMA-4861 Reg.	23	1-8-51	Gn. F	<i>Legis Netherlands</i>	954652	<i>Bessie</i>	51-WMA-4768	6-21-52 Initials	7/1/51	
<i>Sally</i>	E. T. 51-WMA-4987 Reg.	24	12-31-50	Gn. F	<i>Legis Netherlands</i>	954652	<i>Susie</i>	51-WMA-4817	6-21-52 Initials	7/1/51	
<i>Jane</i>	E. T. 51-WMA-4824 Reg.	17	7-48	Gn. F	<i>Legis Netherlands</i>	886309	—	unknown	6-21-52 Initials	3/10/49	
<i>Roz</i>	E. T. 51-WMA-4968 Reg.	18	9-25-52	Gn. F	<i>Nemstead Royal</i>	1028841	<i>Ronni</i>	51-WMA-4821	6-21-52 Initials	3/10/53	
<i>Judy</i>	E. T. 51-WMA-4872 Reg.	19	8-19-48	Gn. F	<i>Legis Baker</i>	886309	—	unknown	6-21-52 Initials	3/10/49	
<i>Kate</i>	E. T. 51-WMA-4861 Reg.	20	9-1-48	Gn. F	<i>Legis Baker</i>	886309	—	unknown	6-21-52 Initials	3/10/49	
<i>Mrs. Colantha Royal</i>	E. T. 51-WMA-4875 Reg.	21	9-16-48	Gn. F	<i>Legis Baker</i>	886309	<i>Nemstead Royal Baker</i>	1963516	6-21-52 Initials	3/10/49	
<i>Julia</i>	E. T. 51-WMA-4875 Reg.	21	10-1-50	Gn. F	<i>Legis Baker</i>	967513	<i>Judy</i>	51-WMA-4872	6-21-52 Initials	4/22/50	
<i>Legis</i>	E. T. 51-WMA-4875 Reg.	22	10-18-50	Gn. F	<i>Legis Baker</i>	967513	<i>Mrs. Colantha Royal</i>	2268076	6-21-52 Initials	4/22/50	
<i>Summers</i>	E. T. 51-WMA-4992 Reg.		2-16-53	Gn. F	<i>Legis Baker</i>	1028841	<i>Legis</i>	51-WMA-4817	6-21-52 Initials		
<i>Margie</i>	E. T. 51-WMA-4993 Reg.		2-21-53	Gn. F	<i>Legis Baker</i>	1028841	<i>Sally</i>	1209330	6-21-52 Initials		
<i>Doll</i>	E. T. 51-WMA-4994 Reg.		3-2-53	Gn. F	<i>Legis Baker</i>	1028841	<i>Nemstead Royal</i>	51-WMA-4817	6-21-52 Initials		
<i>Midge</i>	E. T. 51-WMA-4994 Reg.		3-7-53	Gn. F	<i>Legis Baker</i>	1028841	<i>Marge</i>	51-WMA-4826	6-21-52 Initials		
	E. T. 51-WMA-4994 Reg.										
	E. T. 51-WMA-4994 Reg.										
	E. T. 51-WMA-4994 Reg.										

U. S. GOVERNMENT PRINTING OFFICE: WMA O 320482

FIGURE 7.—Register of animals in herd, DHIA-16: Upper, Front of page; lower, back of page.

INDEX AND YEARLY RECORD OF INDIVIDUAL COWS

This index shall be made at the beginning of each testing year and shall include all cows on test during the testing year. At the end of the testing year, or when a cow leaves the herd during the testing year, the production totals for each cow are transferred from her Individual Lifetime Record (DHIA-22) to this form. Total production for the herd for the testing year is obtained by totaling the individual production records listed on this form. As cows leave the herd, their records (DHIA-22) are moved either to the back of the cow-record section or to an inactive book.

James Smith
HERD OWNER'S NAME
51-12-0437
HERD CODE NUMBER

TESTING YEAR FROM										TO		TESTING YEAR FROM										TO	
Page No.	Barn Name	Days on Test	Days in Milk	Days Dry	Milk (Pounds)	% Test	Butterfat (Pounds)	Value of Product (Dollars)	Concen- trated (Pounds)	Remarks	Page No.	Barn Name	Days on Test	Days in Milk	Days Dry	Milk (Pounds)	% Test	Butterfat (Pounds)	Value of Product (Dollars)	Concen- trated (Pounds)	Remarks		
1	1114680 Legia	182	182	0	5170	39	200	226	1830	Sold 10-3-52													
2	51WMA-4768 Benny	150	150	0	4350	36	158	185	1450	Sold 9-1-52													
3	51WMA-4812 Sue	93	63	30	1280	36	47	54	550	Sold 7-6-52													
4	51WMA-4837 Mae	93	93	0	2420	35	85	102	730	Sold 7-6-52													
5	51WMA-4825 Dot	365	290	75	5950	52	309	330	2460														
6	51WMA-4821 Penny	365	304	61	7240	54	243	300	2960														
7	51WMA-4817 June	365	320	45	7770	50	388	366	2580														
8	1209330 Royal	365	295	70	6230	51	318	314	2380														
9	51WMA-4836 Stacy	365	305	60	7200	51	364	351	3350														
10	51WMA-4830 Betty	365	295	70	6780	50	340	339	2150														
11	51WMA-4817 Nancy	365	305	60	6450	52	336	328	2250														
12	1402567 Ella	365	336	29	6020	53	321	378	3350														
13	51WMA-4838 Dot	365	325	40	12570	36	452	499	3430														
14	51WMA-4826 Mary	365	305	60	10100	37	371	417	3520														
15	2043984 Ruth	365	335	30	19700	34	407	477	3610	Sold 6-1-52													
16	51WMA-4824 Bala	305	274	31	6350	45	283	343	2290	Purchased 9-24-52													
17	51WMA-4828 Jane	192	192	0	6510	32	102	269	1920	Purchased 11-5-52													
18	51WMA-4872 Judy	150	120	30	3850	35	135	162	1210	Purchased 11-5-52													
19	51WMA-4861 Kate	150	140	10	3350	48	161	169	970	Purchased 11-5-52													
20	2268076 Mimi	145	130	15	4560	36	164	185	1020	Purchased 11-10-52													
21	51WMA-4875 Julia	145	124	21	1920	44	85	88	950	Purchased 11-10-52													
22	2567840 Ruth	121	76	45	2540	38	97	110	850	Purchased 12-4-52													
23	51WMA-4881 Ruth	90	90	0	2650	34	91	103	630	Sold 1-2-53													
24	51WMA-4897 Sally	70	70	0	1820	45	82	85	460	Sold 1-22-53													
TOTAL		5901	5719	762	135050	X	5647	6180	X		TOTAL												
AV.		16.17	36.6	48.4	8352	41.2	349	382	X		AV.												

FIGURE 8.—Index and yearly record of individual cows, DHIA-21.

SUPERVISOR'S WORK SHEET FOR CALCULATING LACTATION RECORDS

Barn Name ROSNI

Item
 1. Date fresh - - - - - Year 51 Month 7 Day 54
 2. Date born - - - - - Year 49 Month 1 Day 26
 3. Age - - - - - Years 2 Months 6 Days 28

PRODUCTION SINCE FRESH

4. Total production for testing year -
 5. Total-to-date before freshening -
 6. Item 4 minus item 5 - - - - -
 7. Adjustment for change in centering
 date (+ or -) - - - - -
 8. Production since fresh - - - - -
 (Items 6 + 7)

Days in milk (number)	Milk (pounds)	Fat (pounds)
304	7240	243
115	2380	78
189	4860	165
—	None	—
189	4860	165

COMPLETE LACTATION RECORD

1. Production since fresh - - - - -
 2. Total-to-date before freshening -
 3. Complete lactation - - - - -
 (Items 1 + 2)

223	7790	265
115	2380	78
338	10170	343

FIRST 305 DAYS OF LACTATION

1. Production since fresh - - - - -
 2. Last total-to-date before end of
 305 days - - - - -
 3. Adjustment from next testing period
 to make 305 days - - - - -
 4. First 305 days of lactation - - -
 (Items 1 + 2 + 3)

223	7790	265
61	1340	44
21	(21 x 23.0) 480	(480 x 3.1) 15
305	9610	324

FIGURE 9.—Work sheet for calculating lactation records.

COW IDENTIFICATION				SIRE OF COW				DHIA PRODUCTION REPORT																							
NUMBER				BREED				NUMBER				BREED				FIRST 305 DAYS OF LACTATION PERIOD															
51-WAA-4821				Gr. N.				489435				R. N.				USE BLACK INK ONLY DO NOT FOLD															
DAM OF COW				DATE OF BIRTH				DATE OF CALVING																							
51-WAA-4768				Gr. N.				1 26 49				8 23 51																			
DAYS PREVIOUS	DAYS CAR-	DAYS MILKED	DAYS IN MILK	MILK POUNDS	B'FAT POUNDS	FOR RECORDS																									
NO. PERIOD	RIED CALF	3 TIMES				LESS THAN 305-DAYS																									
✓	191	-	305	9610	324	DATE DRY:																									
REMARKS:				WEIGHT:				TYPE:				OR DATE COW										LEFT HERD:									
				1150																											
HERD CODE				HERD OWNER NAME AND ADDRESS																											
STATE	COUNTY	HERD NO.																													
51	12	0437	Jim Smith, Smithville, Md.																												
				Association: Greene County																											
CERTIFIED BY DHIA SUPERVISOR:				STATE				DATE:																							
James Row				Md.				6-20-52																							
REPORTED THROUGH AND APPROVED BY STATE AGRICULTURAL COLLEGE																FORM APPROVED BUDGET BUREAU 40-R-1912															

FIGURE 10.—DHIA production report, DHIA-718.

YEARLY HERD SUMMARY DHIA-780				TESTING			
(REVISED 1943) U.S. DEPARTMENT OF AGRICULTURE-ARS-DH FORM APPROVED BUDGET BUREAU NO. 40-R-1912				YEAR FROM			
51-12-0437				Apr. 5 1952 TO Apr. 4 1953			
HERD CODE				OWNER'S NAME			
R. & Gr. N.				Jim Smith			
BREED OF HERD				ADDRESS OF OWNER			
1260				Smithville, Md.			
AV. WT. OF HERD				ASSOCIATION OR COUNTY			
1260				Greene County			
TOTAL COW-DAYS ON TEST				AVERAGE			
5901				CONCENTRATES FED			
MILK (POUNDS)				TOTAL COW-DAYS ON PASTURE			
135050				G. 2596			
BUTTERFAT (POUNDS)				COST OF PASTURE			
5647				DOLLARS ONLY (OMIT CENTS)			
VALUE OF PRODUCT				COST OF ROUGHAGE			
6180				DOLLARS ONLY (OMIT CENTS)			
SUCCULENT ROUGHAGE FED				COST OF CONCENTRATES			
E 728				DOLLARS ONLY (OMIT CENTS)			
DRY ROUGHAGE FED				TOTAL FEED COST			
G 586				DOLLARS ONLY (OMIT CENTS)			
CERTIFIED BY DHIA SUPERVISOR:				STATE:			
James Row				Md.			
REPORTED THROUGH AND APPROVED BY STATE AGRI. COLLEGE				DATE: 3-21-53			

FIGURE 11.—Yearly herd summary, DHIA-780.

HOW MUCH SHOULD WE CHARGE FOR PASTURE?

The amount of feed consumed by cows on pasture depends on the size of the cows and the quality of the pasture. The biggest difference between the cost of pasture and the cost of hay is the cost of harvesting the hay. Cost account studies show that a logical charge for pasture is one-half the price of its hay-equivalent or hay-replacement value. The following table shows the estimated charge for pasture when good hay is worth various amounts per ton:

Table for Estimating the Charge for Pasture

Quality of pasture				Price per ton of good hay				
Excellent	Good	Fair	Poor	\$20	\$25	\$30	\$35	\$40
Average weight of cows in herd (pounds)				Monthly charge for pasture				
1,400				\$6.50	\$8.10	\$9.80	\$11.40	\$13.00
1,300				6.00	7.50	9.00	10.50	12.00
1,200	1,400			5.50	6.90	8.40	9.60	11.00
1,100	1,300			5.00	6.30	7.50	9.00	10.00
1,000	1,200	1,400		4.50	5.60	6.80	7.90	9.00
900	1,100	1,300		4.10	5.10	6.10	7.20	8.20
	1,000	1,200		3.80	4.70	5.60	6.70	7.50
	900	1,100	1,400	3.30	4.20	5.00	5.80	6.70
		1,000	1,300	3.00	3.80	4.50	4.40	6.00
		900	1,200	2.80	3.40	4.10	4.80	5.50
			1,100	2.50	3.10	3.70	4.40	5.00
			1,000	2.30	2.90	3.40	4.00	4.50
			900	2.00	2.60	3.10	3.60	4.00

To use the table:

1. Make a careful estimate of the quality of the pasture (p. 17, DHIA Manual) ----- Good
2. Estimate the average body weight of the herd ----- 1,200
3. Determine the price of good hay ----- \$30
4. Locate the average body weight of the herd in the appropriate pasture column, and on the same line under price of hay will be found the monthly charge for pasture ----- \$6.80

Example

The table should be used as a guide. When cows do not have access to pasture day and night or when liberal amounts of hay and silage are being fed, reduce the pasture charge proportionately.

Soilage

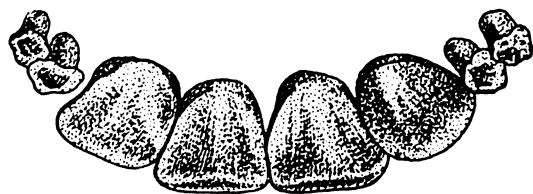
Soilage (harvested green feed) is worth one-fourth the price of good hay. In estimating the capacity of wagons or feed carts, figure 20 pounds per cubic foot.

HOW TO TELL THE AGE OF DAIRY CATTLE¹

As the animal approaches 2 years of age, the central pair of temporary incisor teeth or pincers is replaced by the permanent pincers. At 2 years, these teeth attain full development. The permanent first intermediates, one on each side of the pincers, are cut at about 2½ years, and they usually are fully developed at 3 years.



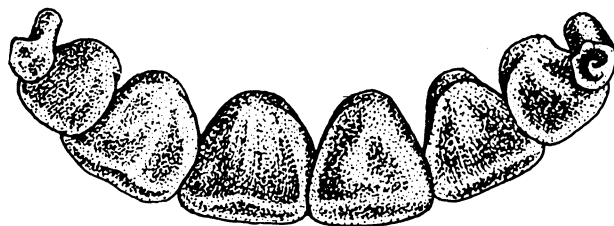
Internal face of incisors at 2 years.



Internal face of incisors at 3 years.

At 3½ years, the second intermediates or laterals are cut. They are on a level with the first intermediates and begin to wear at 4 years. At about 4½ years, the corner teeth are replaced. At 5 years, the animal usually has the full complement of incisors with the corners fully developed.

¹ From Farmer's Bulletin 1721.



Internal face of incisors at 4 years.

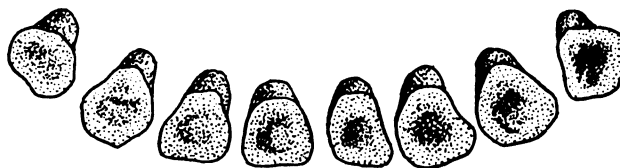


Internal face of incisors at 5 years.

At 5 or 6 years, there is a leveling of the permanent pincers, the pincers usually being leveled at 6 years, both pairs of intermediates being partially leveled, and the corner incisors showing wear.

At 7 or 8 years, there is a noticeable wearing of the pincers; at 8 or 9 years, of the middle pairs; and at 10 years, of the corner teeth.

After the animal passes its 6th year, the arch gradually loses its rounded contour. It becomes nearly straight by the 12th year. In the meantime, the teeth have gradually become triangular in shape and distinctly separated, and show progressive wearing to stubs. This condition becomes more marked with increasing age.



Internal face of incisors at 12 years.

Ten Points for DHIA Supervisors

1. On your first visit to a farm, make it a point to get acquainted. Favorable first impressions go a long way toward obtaining the cooperation that will help to make your services most useful. Do not talk too much. Be a good listener. Be helpful, but do not put yourself forward.

2. Help; don't hinder. Fit yourself into the mode of living on each farm you visit. Your visit should cause the least possible disturbance to the family's normal living habits.

3. Spend the evening with the farmer and his family if it is convenient for them to have you do so. If the association operates a central testing laboratory and you do not stay overnight with the farmer, spend as much time as possible with the farmer while you are visiting the farm. You can learn much from him and he may learn something from you.

4. Be pleasant and agreeable, but do not carry gossip.

5. Mix praise with helpful criticism in such a way that the farmer will gladly follow your advice. The best way is to lead up to an idea in such a manner that the farmer himself will be the first to mention the need for and method of improvement.

6. Keep yourself well informed on the new phases of your work. Constantly new facts are being found and new methods are being developed for conducting a dairy-herd-improvement program. You should have the latest information at all times.

7. Complete the records and bring them up to date at each visit. Records that are not complete or are not up to date are not of maximum value to the owner. If your record work is in arrears, the dairyman may justifiably think you are not capable of handling your job. Leave the herd-record book on the farm. If the tests and record work are done in a central laboratory, return the records and the herd-record book to the farmer at the earliest possible moment.

8. Promote cooperation among your farmers, but do not make yourself conspicuous. Be "the power behind the throne," but do not try to sit on the throne.

9. Publish favorable results and give each owner and each herd as much publicity as the facts will warrant.

10. Dairy-herd-improvement-association work is an agricultural extension project. It is a part of the local county agent's extension program. The county agent can help you and you can be of assistance to him. If at all possible, visit his office and talk over your work with him at least once a month.

